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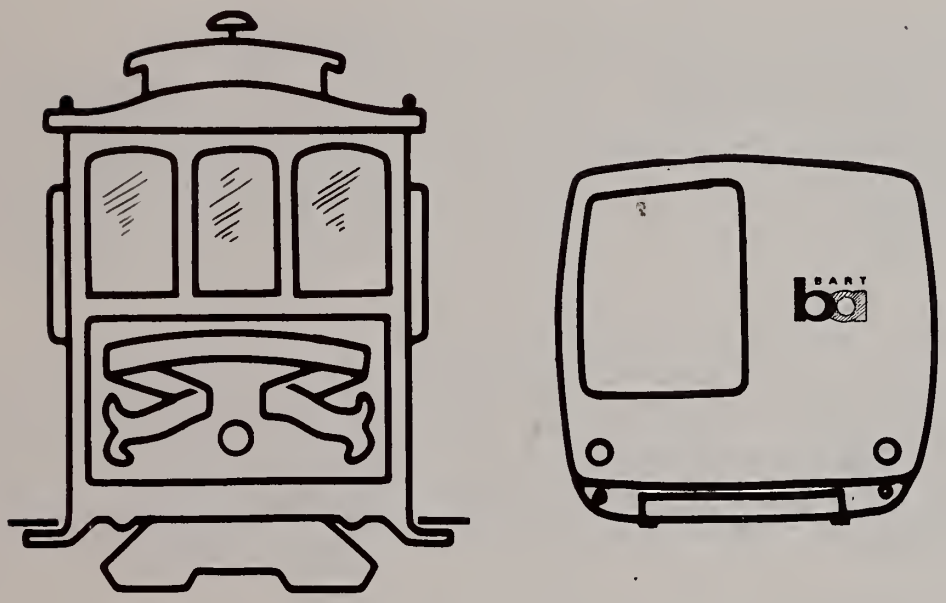

COORDINATION

IMMEDIATE ACTION RECOMMENDATIONS

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(415) 861-1302

January 31, 1973

BART/Muni Coordination Board
949 Presidio Avenue
San Francisco, California 94115

Gentlemen:

We are pleased to submit our mid-project report for the BART/Muni Coordination Study. In accordance with our agreement of May 18, 1972, the report identifies immediate action recommendations for the Mission Corridor of San Francisco. Included are (1) Muni service improvements that should be undertaken now, in advance of BART opening, and (2) improvements geared to BART opening, but requiring a great amount of lead time. Complete plans for BART/Muni routing, scheduling and fare coordination will be included in our final report issued at the end of the study.

Many of the recommendations are in direct response to transit goals identified by the community groups during early stages of the BART/Muni Coordination Study. In formulating recommendations, we reviewed earlier proposals by the 1967 Northern California Transportation Demonstration Project (NCTDP), the 1971 Improvement Plan for Transportation prepared by the San Francisco Department of Planning and suggestions by Technical Committee members and community groups. Proposals were screened to select those with greatest benefit to the community and with greatest support for their implementation.

Five types of transit proposals are outlined in the immediate action recommendations: (1) station area improvements where construction is needed to make local transit function better when BART opens; (2) rerouting so as to better serve the community and BART; (3) transit lanes to relieve transit from vehicular congestion; (4) shelters to increase passenger comfort; and (5) public information to improve understanding and utilization of the transit system. Proposals have been carefully reviewed by the Project Director, Technical Advisory Committee, and by the community through a series of public meetings and discussions.

We urge the BART/Muni Coordination Board to accept the recommendations and to set machinery in motion to achieve their timely implementation.

Sincerely,

DE LEUW, CATHER & COMPANY

H. E. Lloyd
Senior Vice President

Gustave E. J. Lamart
Project Manager

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INTRODUCTION

This report contains proposals recommended for early implementation by Muni and BART, to achieve BART/Muni coordination and to encourage transit use in general. The proposals are submitted to the BART/Muni Coordination Board for their consideration, approval and subsequent action by BART, Muni, the San Francisco Public Utilities Commission and the Board of Supervisors.

It is important to set machinery in motion now to achieve timely implementation of these recommendations. Postponing consideration of these obvious improvements until the end of the BART/Muni Coordination Study would simply deny the public benefits to be derived from early implementation.

Two types of proposals are included: (1) Muni service improvements that do not need to wait for BART opening; and (2) improvements geared to BART opening, but requiring a great amount of lead time. All recommendations are compatible with initiation of BART service in San Francisco and any overall BART/Muni coordination plan. Routing, scheduling, transfer fare discount and other matters keyed to BART opening will be thoroughly discussed in the final plan report.

The final plan report will contain additional proposals similar to those contained herein. Other improvement ideas will be developed as the study progresses. Recommendations for more complicated situations, such as service on Mission and Market Streets, have been deferred for further consideration.

In formulating the recommendations put forward at this time, we reviewed earlier proposals by the 1967 Northern California Transportation Demonstration Project (NCTDP), the 1971 Improvement Plan for Transportation prepared by the San Francisco Department of Planning and suggestions by Technical Committee members and community groups.

Recommendations are divided into five groupings:

Station Area Improvements -- construction needed in the vicinity of BART stations to make transit service function better when BART opens.

Rerouting -- modifications in bus and trolley coach service so as to better serve the community and complement BART.

Transit Lanes -- special rights of way, taking transit out of vehicular congestion and giving it a competitive edge over the automobile.

Shelters -- providing protection from inclement weather, thereby improving patron comfort and transit usage.

Public Information -- signs and handouts to improve understanding and, hence, utilization of the transit system.

SUMMARY

Thirteen recommendations emerged as clearly beneficial to transit riders and the community:

Station Area Improvements

K Line Extension and Loop at Balboa Park BART Station

A streetcar loop should be constructed from Ocean Avenue, passing a new east entrance to the Balboa Park BART Station, and connecting with existing trackage on San Jose Avenue. Loop construction would be compatible with design for reconstructing the adjacent Elkton Yard, and could proceed immediately in advance of Yard construction. Although a single track loop is adequate for single-end streetcar operation, space should be provided for an eventual parallel second track.

City College Streetcar Stop

Substitute wide center-street passenger loading islands on Ocean Avenue at Phelan for the Phelan Loop.

Glen Park Station Improvements

Provide a left-turn pocket on Bosworth Street at Arlington Street. Reconstruct the freeway on-ramp to tie into the same intersection. Construct a pedestrian bridge across Bosworth from the BART station to the north side bus stop and short-term parking. Reserve vacant BART-owned land north of Bosworth for construction of additional "kiss and ride" space, if acute traffic congestion results when BART opens.

Shelters at Glen Park, 16th Street and 24th Street Stations

Construct shelters architecturally compatible with the existing structures adjacent to Muni loading areas.

Civic Center and Embarcadero BART/Muni Interchange

Immediate construction of direct interchange stairways and exit and entrance gates at the two potentially important interchange stations -- Civic Center and Embarcadero. For a minimum solution, Civic Center installation would be marginally cheaper due to an existing stairway, and would serve the maximum riders.

Reroutings

33/41 Line Improvements and Folsom/Howard Transit Lane

Provide a reverse-flow lane for Muni service on Folsom between 11th Street and Fourth Street, and on Howard between Third Street and Fremont Street. Re-route the 41 line to run two ways on Folsom Street between 24th Street and 4th Street, and two ways on Howard Street between Third Street and Beale Street. Re-route the 33 line to run both ways on Folsom between 16th Street and Fourth Street.

Straightening Route 47

Straighten the 47 route to follow Potrero, Division and South Van Ness. The intersection of Howard and South Van Ness should be reconstructed and signalized to accommodate autos and transit turning movements.

Express Bus Improvements

Service on the 17X and 26X should be speeded up via additional freeway routing. Routing the 14X via I-280 would avoid traffic tie-ups at the I-280-Bayshore Freeway interchange. The 26X should be extended to downtown.

Transit Lanes

First Street Improvements

Place physical barriers beside and within the transit lane from Stevenson Street to the Transbay Terminal and along the east side of the lane from Stevenson to Market Street. Move three bus stops and channelize First Street north of Market Street.

Shelters

Shelters for Major Transfer Points

Select major transfer points for provision of transit shelters, each tailored to the requirements of the particular location. Sixteen locations within the study area have been targeted for initial shelter installation.

Public Information

Transit Stop Signing/Design Coordination

A program of uniform transit stop sign installation should be immediately initiated by the Muni. Special attention should be given to adopting an attractive design with informative content. It is recommended that Muni retain an industrial designer to assist in the refinement of sign design and to ensure coordination of signs, vehicles and shelter design.

Publication and Distribution of Schedule Cards

The printing and distribution of schedule cards should be given high priority, starting with long headway lines. The resources of businessmen and City Offices should be used to assist in distribution of the cards. Schedule cards printed on adhesive paper can be attached to poles or schedule collars at key stops.

System Mapping

Proposed mapping should include all public transit services available for all of San Francisco. Each public transit agency should have the opportunity to review maps for accuracy and clarity prior to printing. MTC would serve as mapping coordinator.

Nearly all of the recommendations require planning prior to construction, rerouting, or other improvement. Most require agency budgeting. Initial capital costs, annual operating cost, and possible funding sources are shown in Table 1. To be eligible for Urban Mass Transit capital grant monies, grant applications must be filed for the proposals or revisions made in existing applications.

Construction improvements (recommendations 1-7, 9 and 10) require detailed engineering or architectural design prior to construction. In most cases design and construction responsibility falls clearly to one agency: Muni, BART or the San Francisco Department of Public Works. In several cases, however, considerable interagency cooperation will be required. The City College streetcar stop and straightening Route 47 are related to potential Department of Public Works traffic improvement projects. Muni and Public Works' projects should proceed simultaneously.

Revisions of transit routes (recommendations 6-8) require public hearing, scheduling, and driver sign up. Three months' lead time is required before changes can become operational.

Table 1
FINANCIAL SUMMARY
Immediate Action Recommendations

Recommendation	Capital Costs	Funding Source	Annual Operating Costs	Funding Source
1. K Line Extension and Loop at Balboa Park BART Station	$100,000	2/3 Federal, UMTA 1/3 City SB 325	$100,000	1/3 Fare box 2/3 City Revenue Sharing
2. City College Streetcar Stop	145,000	2/3 Federal, UMTA 1/3 City SB 325	---	
3. Glen Park Station Improvements	75,000	2/5 Federal, UMTA 1/5 BART 2/5 Public Works, Gas Tax	---	
4. Shelters at Glen Park, 16th and 24th Street BART Stations	30,000	2/3 Federal, UMTA 1/3 BART	---	
5. Civic Center and Embarcadero Station BART/Muni Interchange	410,000	2/3 Federal, UMTA 1/3 BART	10,000	BART
6. 33/41 Line Improvements and Folsom/Howard Transit Line	205,000	2/3 Federal, UMTA 1/3 Hetch Hetchy	---	
7. Straightening Route 47	150,000	1/3 Public Works, Gas Tax 4/9 Federal, UMTA 2/9 Hetch Hetchy	---	
8. Express Bus Improvements			---	
9. First Street Improvements	10,000	Public Works Gas Tax	---	
10. Shelters at Major Transfer Points	45,000	2/3 Federal, UMTA 1/3 City SB 325	---	
11. Signing Transit Stops/Design Coordination	50,000	2/3 Federal, UMTA 1/3 City SB 325	5,000	City Revenue Sharing
12. Printing and Distribution of Schedule Cards	15,000	2/3 Federal, UMTA 1/3 City SB 325	10,000 plus an initial $20,000	City Revenue Sharing
13. System Mapping	---		---	
TOTAL	$1,235,000	$764,000 Federal, UMTA $162,000 BART $118,000 City SB 325 $101,000 Hetch Hetchy $ 90,000 Public Works, Gas Tax $1,235,000	$125,000	$33,000 Farebox $82,000 City Revenue Sharing $10,000 BART $125,000

STATION AREA IMPROVEMENTS

K Line Extension and Loop at Balboa Park BART Station

Problem

The K Line currently terminates at Phelan Loop, about one-quarter mile west of Balboa Park BART Station. With BART opening, service should logically be extended to the BART station to provide feeder service for City College and other points along the K Line. Streetcar tracks are already in place along Ocean Avenue, linking Phelan Loop and the Geneva Carbarn. However, unless corrective action is taken, the K Line extension will conflict with carbarn functions, inconvenience passengers and create safety problems.

Recommendation

A streetcar loop should be constructed from Ocean Avenue, passing a new east entrance to the Balboa Park BART Station, and connecting with existing trackage on San Jose Avenue (see Figures 1 and 2). Loop construction would be compatible with design for reconstructing the adjacent Elkton Yard, and could proceed immediately in advance of Yard construction. Although a single track loop is adequate for single-end streetcar operation, space should be provided for an eventual parallel second track. The parallel track would permit possible through-routing of the M and K Lines or stub-end operation into the Balboa Park BART Station. Barring completion of the loop by the time BART opens, the K Line could operate on a temporary basis via a wye on Ocean Avenue adjacent to the BART station.

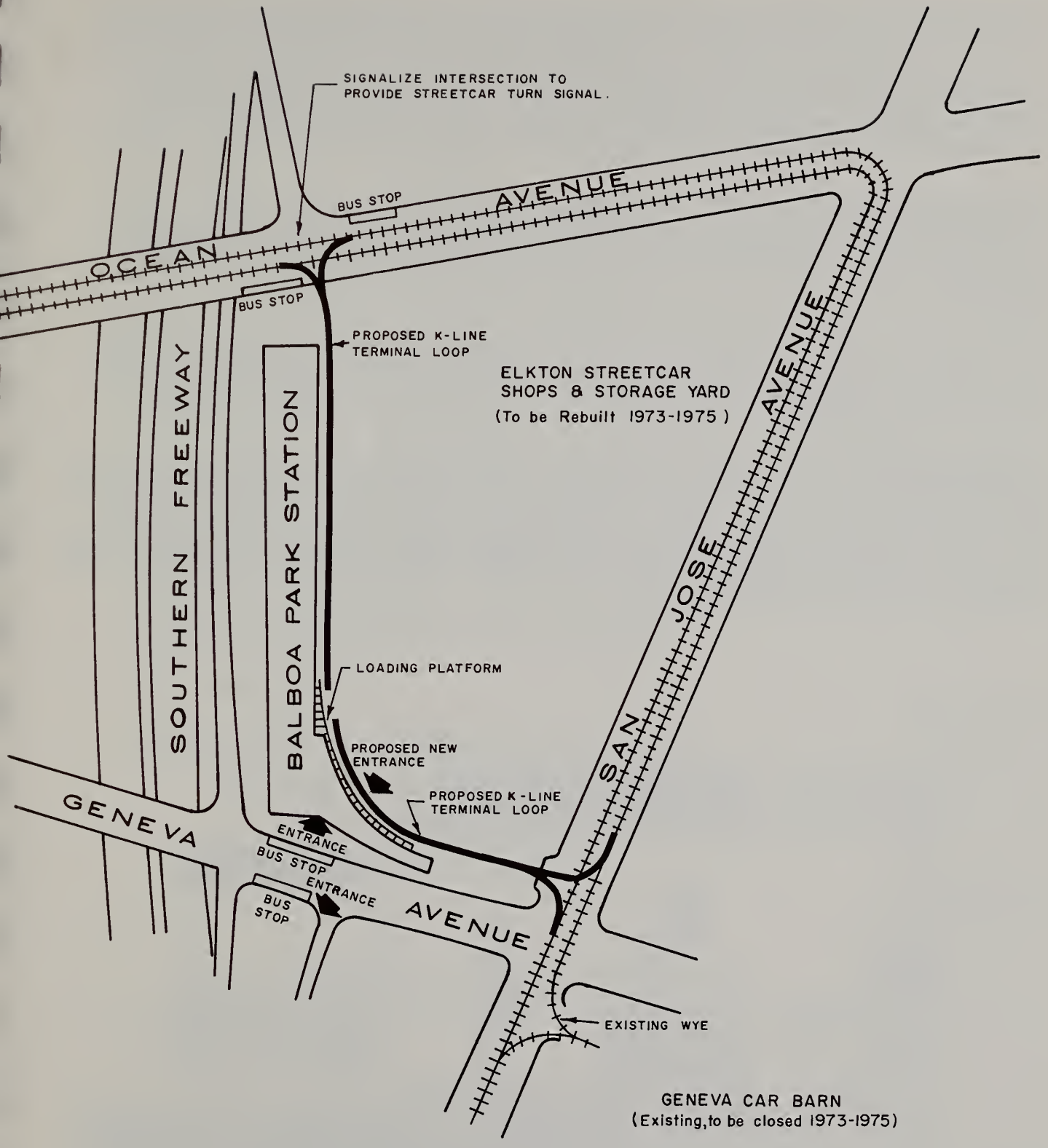
Financial Summary

For initial single track loop: capital cost, $100,000; annual operating cost, $100,000; annual revenue, $30,000. A parallel second track with crossovers would involve an additional $100,000 capital cost.

Analysis

The present Balboa Park BART Station is laid out with the main entrances astride Geneva Avenue. Existing streetcar trackage runs on Ocean Avenue, 800 feet from the entrance to the station and on San Jose Avenue, 200 feet from the entrance. About 300 passengers are expected to make the BART/K Line transfer during the two-hour peak period.

The K Line extension will require a terminal loop or wye, since current cars are single ended. The only loop at present is through the Geneva Carbarn. Apart from conflicts with carbarn operations, this does not offer convenient passenger interchange with BART. Use of an existing wye on San Jose Avenue at the carbarn exit has similar drawbacks.



1

Balboa Park Station

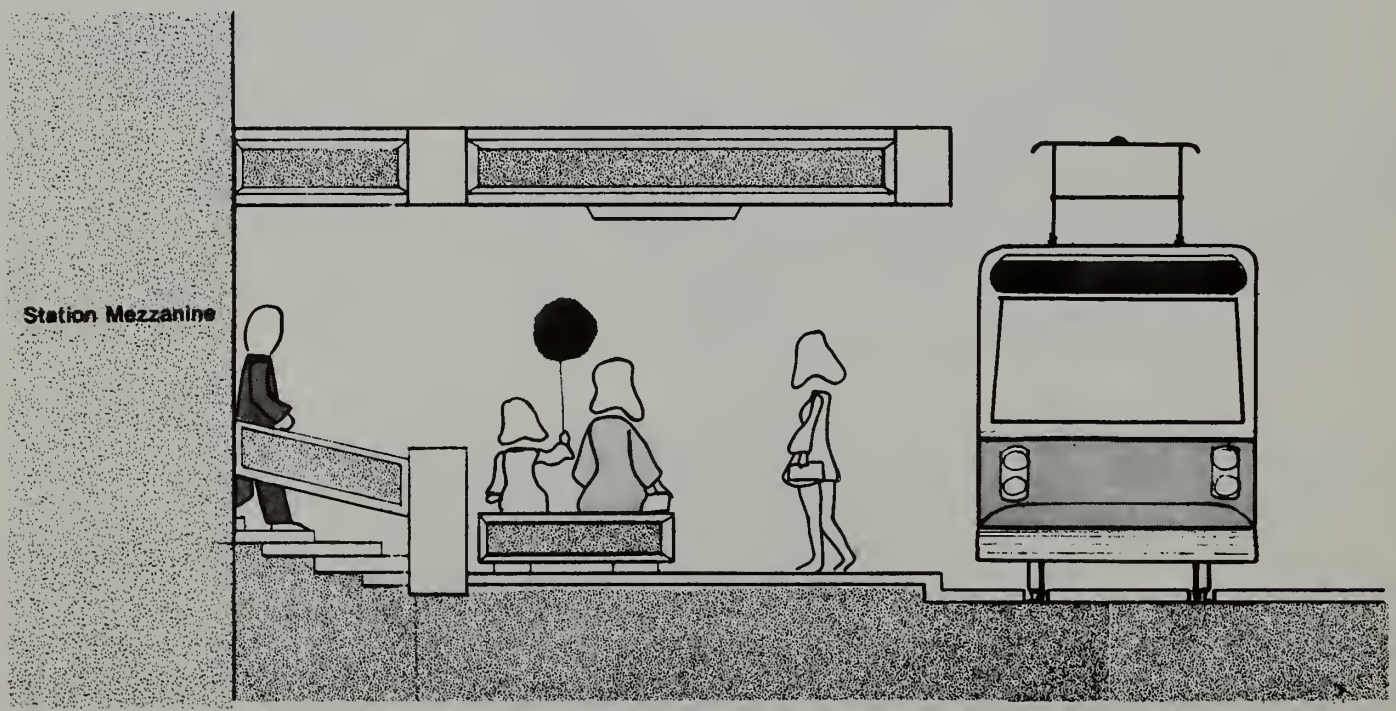
Proposed K-Line Loop Layout

The proposed loop provides an off-street passenger loading area on property presently owned by Muni. It delivers and collects interchange passengers within a few feet of the BART entry/exit gates. The loop would save transferring passengers one to two minutes of riding and walking time plus eliminating the need to cross busy streets or stand in inclement weather. The loop would save operators four to five minutes per round trip when compared with looping through the carbarn or negotiating the wye.

Entrance to the Balboa Park BART Station can be obtained through a sliding steel grill gate along the east side of the station. Access would be onto the BART ticketing level just outside the fare gates. The station interior would provide all-weather shelter for transferring passengers.

The turning movement from Ocean Avenue into the loop would be signalized. The streetcar would come to a stop in the center of the street, actuating a signal to halt traffic in the right lane. Slowing or stopping the streetcar on the downhill turn is also a safeguard against derailment on this reverse super-elevated curve.

Space should be provided next to the BART station for the addition of a second track and crossovers to permit stub-end K Line operations with arrival of the double end streetcars. Likewise, space should be provided for possible M Line extension from San Jose Avenue, and direct K-M connection passing the new east entrance to the BART station. This latter arrangement would require, in effect, a double track loop.



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K · Line Extension
Station Boarding Area

Although construction of the loop prior to BART opening would be desirable from a transit rider viewpoint, loop construction must be coordinated with plans for reconstructing the Elkton Yards. The Yard designer (International Engineering Company) believes the loop would not constrain the design of the yard and that the loop could be built prior to yard construction. There is a possibility that the loop could be used as part of the yard's ladder track, thereby conserving yard space. This and other joint use possibilities would need to be explored in the next few months.

It is recognized that early construction of the loop connecting the K Line with BART will create some inconvenience to Muni yard operations, but these problems can be overcome and should not be allowed to block timely completion of the loop and create inconvenience to the transit rider. The initial loop arrangement will occupy some yard space now used for bus storage. Buses displaced by the loop will have to be stored elsewhere, perhaps Potrero Division where space is now available.

It should be possible to complete the loop by early 1974, a few months after BART opening in San Francisco. The K Line extension can be operated prior to loop completion, but a wye should be built immediately at Ocean Avenue to facilitate streetcar turnaround and off-street loading and unloading. Turnaround at the Ocean Avenue wye is preferable to using the Geneva Carbarn loop or wye. Typically from two to five streetcars back up southbound on San Jose Avenue at Geneva following the peak periods. Operating the K Line extension through this congestion could require drivers to change streetcars, result in occasional midblock unloading (undesirable from passenger safety and convenience standpoints) and perhaps interfere with service all along the K Line.

Cost of Improvements

The following costs are applicable to a single track loop:

Single track and wiring, 900 feet at $70	$ 63,000
Two turnouts at $5,000 each	10,000
Construct platform at $5,000	5,000
Signalize intersection on Ocean	10,000
Total	$ 88,000
Plus design and contingencies, say	$100,000

A double track loop, requiring more intricate trackwork, would cost about twice the single track loop:

Track and overhead wiring, 900 feet at $125	$112,500
Six turnouts and two crossovers at $5,000	40,000
Construct two platforms	8,000
Signalize intersection at Ocean	10,000
Total	$170,500
Plus design and contingencies, say	$200,000

Operating the K Line extension will require two additional vehicles plus three to four drivers costing approximately $100,000 per year. An estimated 1,000 BART feeder patrons per day (from computer simulation of transit network) or approximately 300,000 per year could be expected to use the K Line extension. At 10¢ per passenger average this generates approximately $30,000 per year revenue.

City College Streetcar Stop

Problem

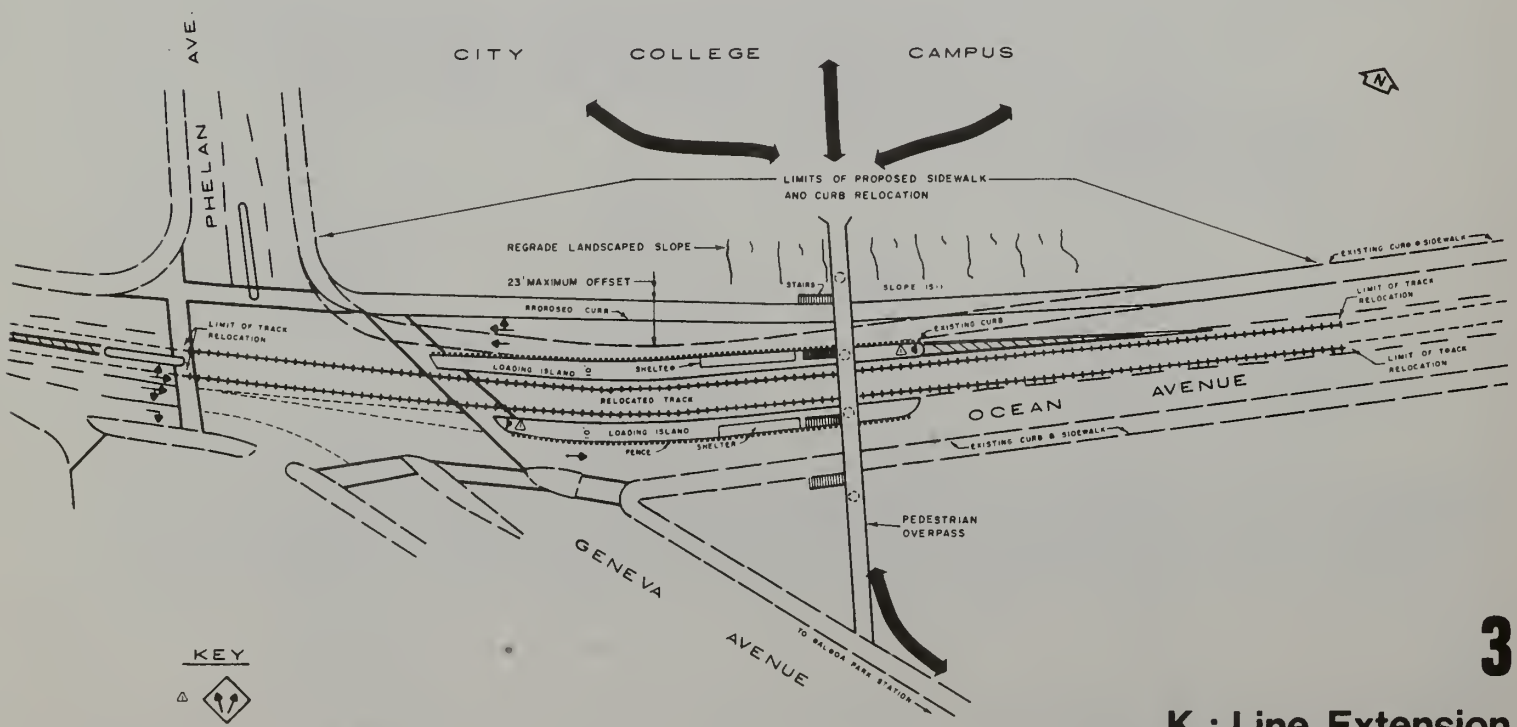
The benefits of extension of the K Line to Balboa Park BART Station with the purpose of using the K Line for BART feeder purposes would be negated somewhat by use of the Phelan Loop. The time involved in traversing the Loop reduces the utility of the K Line as a BART feeder. The problem is to speed up the K Line for BART feeder purposes without reducing its attractiveness to City College users.

Recommendation

Substitute wide center-street passenger loading islands on Ocean Avenue at Phelan for the Phelan Loop (see Figures 3 and 4).

Financial Summary

Capital cost, $145,000.



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K · Line Extension
City College Stop

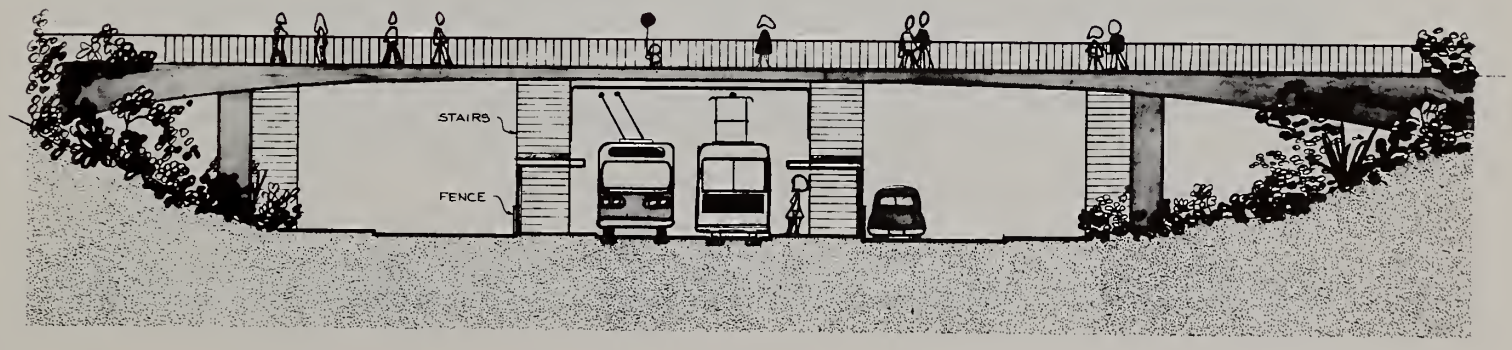
Analysis

The predominant K Line movement at the Phelan Loop area would be boarding or alighting (about 600 per peak hour), as opposed to through movement to or from the BART station (about 200 during the same period). Transfer movements are not taken into consideration because they can be performed at Balboa Park BART Station as well as at Phelan Loop.

A minimum of one and one-half minutes are needed to complete Phelan Loop turning and traversing movements. The perceived time for BART feeder passengers may be almost twice that time, as riders will view the diversion as unnecessary delay. Streetcar turning movements on and off of Ocean Avenue would double by the extension of the K Line to Balboa Park BART Station, causing traffic delays which in turn block transit movements and produce additional transit delay.

A number of alternatives to meet the design requirements of the City College stop were considered. The following criteria were developed from meetings with the citizens in the area, City College officials, City Traffic Engineering Department and field observations:

- The K Line is a low headway trunk line and should be as fast and direct as possible.
- If on-street stops are to be provided, they must protect riders from fast-moving auto traffic and provide shelter for waiting passengers.
- Provision must be made for the existing level of traffic flow, directioned movements and fire station access.



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City College Transit Stop
Pedestrian Overpass

The recommended passenger-loading islands have the following advantages:

- The walking distance to destinations at City College is a little shorter than from the present Phelan Loop.

- There is less vehicular traffic on Ocean Avenue east of Phelan than west of the intersection, thus increasing safety and resulting in less traffic delay from the boarding movement.

- The cost is less than other far more extensive solutions judged less beneficial. Solutions immediately west of the Ocean-Phelan intersection involve intersection reconstruction. Solutions in the center of Ocean Avenue in front of the present Phelan Loop require condemnation of part of the Safeway parking lot or demolition of a corner of the fire station as well as roadway reconstruction.

The recommended solution proposes the widening of Ocean Avenue to provide two traffic lanes on each side of an exclusive transit way. The City Traffic Engineering Department plans reconstruction of the entire Ocean-Geneva-Phelan intersection to increase its capacity. The design of transit and traffic improvements logically should proceed together.

The plan includes a pedestrian overpass across Ocean Avenue, with stairways leading to the passenger-loading islands. The overpass and guardrails are considered essential to pedestrian safety from fast-moving Ocean Avenue traffic. The proposed overpass offers pedestrian access and safety equal to, if not better than, the current Phelan Loop. On the campus City College should construct sidewalks leading to the overpass. This overpass will also serve pedestrian traffic from City College to the BART station entrance on Geneva Avenue.

Both streetcars and trolley coaches should use the proposed new City College stop. Streetcar and trolley coach wires could be set sufficiently far apart, e.g., four feet, to avoid contact between the pantagraph and the trolley coach wires.

Eliminating the Phelan rail loop will provide space for alternate uses, including possible increased off-street bus layover and boarding space to implement BART/Muni coordination plans.

Cost Estimate

Reconstruct 650 feet of double track, including paving	$ 65,000
Construct loading islands, 6,500 square feet	6,500
Pedestrian bridge and stairs	15,000
Install shelter	3,000
Relocate traffic signals	10,000
Widen Ocean Avenue	15,000
Relocate utility line	12,000
Landscaping	1,000
Total	$127,500
Plus design and contingencies, say	$145,000

These costs should be eligible for two-thirds federal grant monies.

Glen Park Station Improvements

Problem

Unless corrective action is taken, severe circulation problems are expected at Glen Park due to the inability of the street pattern to handle BART-oriented "kiss and ride" traffic.

Scarcity of short-term parking spaces and difficulty in making U-turns or in circling the block will lead auto drivers to double park and occupy bus stops when picking up or dropping off passengers at the station. Buses will be slowed by the resulting congestion.

Recommendation

Provide a left-turn pocket on Bosworth Street at Arlington Street. Reconstruct the freeway on-ramp to tie into the same intersection. Construct a pedestrian bridge across Bosworth from the BART station to the north side bus stop and short-term parking. Reserve vacant BART-owned land north of Bosworth for construction of additional "kiss and ride" space, if acute traffic congestion results when BART opens (see Figure 5).

Financial Summary

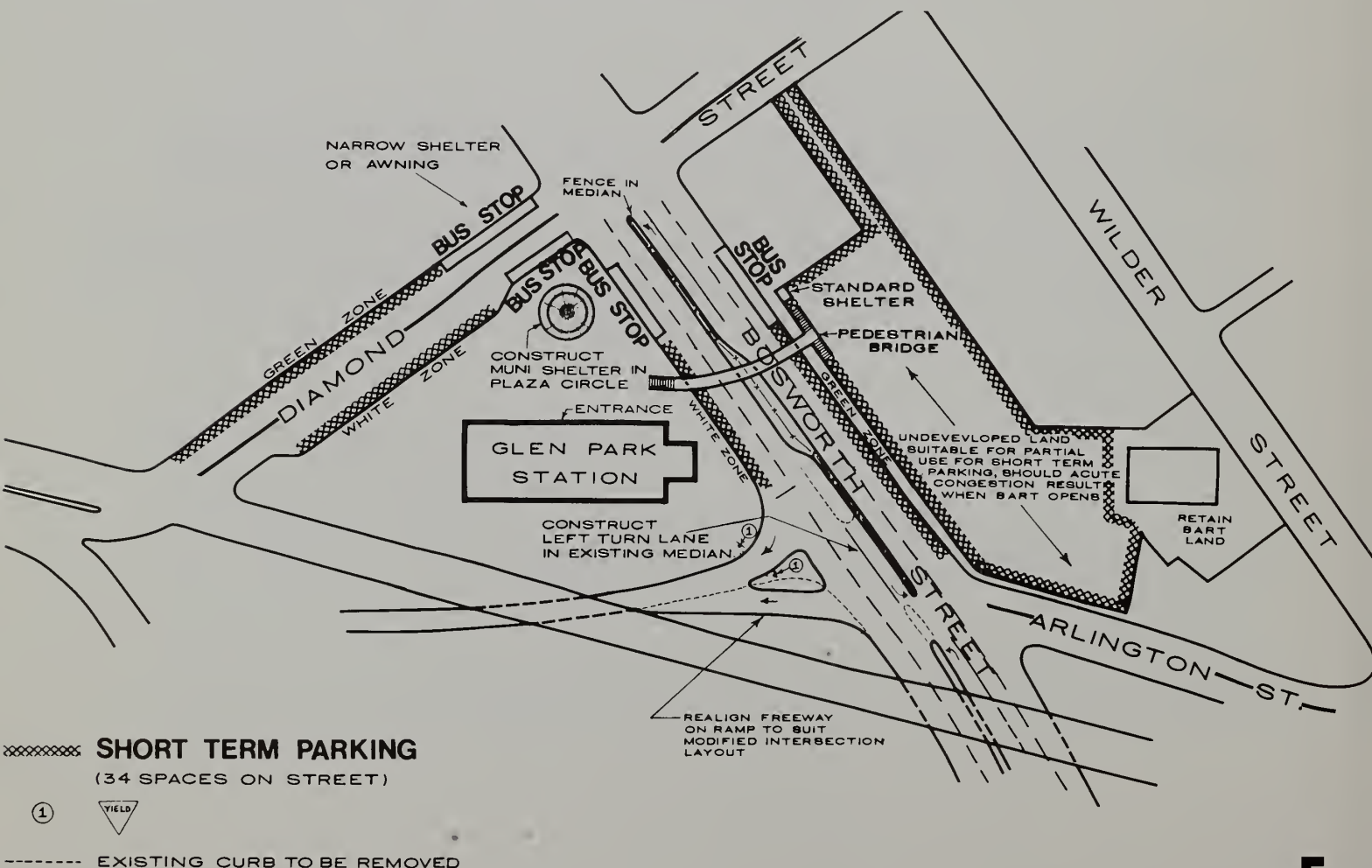
Capital cost, $75,000.

Analysis

Drivers coming to the station from the west to pick up or drop off passengers will be unable to return without going under the freeway, considerably out of their way. The provision of a left-turn pocket on Bosworth Street at Arlington Street will greatly simplify the movement for these drivers, making them less inclined to park in bus stops or to double park in front of the station. Realignment of the freeway ramp is recommended so as to tie in with Arlington Street and the left-turn pocket.

The pedestrian bridge over Bosworth traffic will increase pedestrian safety and facilitate the use of the north-side bus stop and the potential "kiss and ride" lot. A short attractive fence in the center of Bosworth Street will be needed to make the pedestrian bridge totally effective.

Passenger projections for 1975 prepared by BART anticipate some 900 cars may deliver or pick up BART passengers in the peak two-hour period at the Glen Park Station. There are only 31 possible stopping spaces on Diamond Street and Bosworth Street, adjacent to the station, after allocating space for bus zones. Vacant land exists on the north side of Bosworth, where an additional 60 short-term off-street parking spaces could be provided. Although current BART plans call for resale or lease of the vacant parcel for commercial use, off-street parking could be incorporated into plans for reuse of the parcel.



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Glen Park Station
Proposed Muni and Auto Feeder Facilities

Cost Estimate

Changes to roadway and freeway ramp	$ 30,000
Pedestrian bridge	12,000
Fence in Bosworth Street median	5,000
Grading and Paving of short-term parking area	15,000
Total	$ 62,000
Plus design and contingencies, say	$ 75,000

The pedestrian bridge, fence and short-term parking area should be eligible for two-thirds federal capital grant financing. Reworking the freeway ramp would be covered by federal and state highway funds.

Shelters at Glen Park, 16th Street and 24th Street Stations

Problem

Shelters for passengers transferring to Muni have not been constructed at the Glen Park, 16th Street and 24th Street BART Station sites.

Recommendation

Construct shelters architecturally compatible with the existing structures adjacent to Muni loading areas (see Figure 6).

Financial Summary

Capital cost, $30,000.

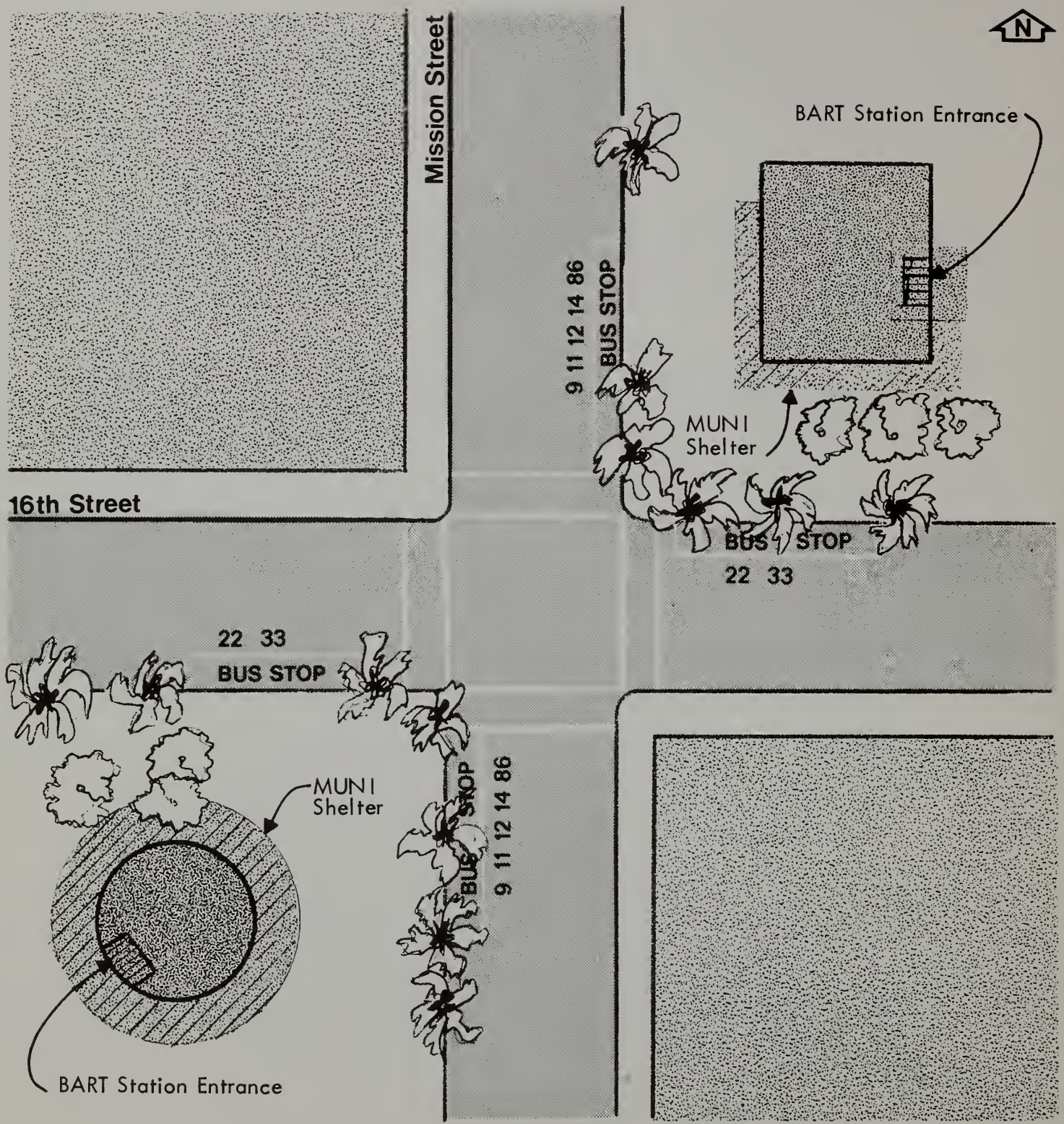
Analysis

The BART station plazas at Glen Park, 16th and 24th Streets all show strong individual architectural themes. There are areas within these plazas where bus stops must be provided and shelters erected for the large number of passengers waiting for Muni feeder lines. The erection of many units of the standard shelter at such places would violate the architectural unity of these plazas. Special shelter designs, perhaps by the architects who originally designed the stations, would complement the original theme.

Cost Estimate

Sixteenth Street Station	$ 10,000
Twenty-Fourth Street Station	10,000
Glen Park Station	10,000
Total	$ 30,000

The shelters should be eligible for two-thirds federal transit capital grant financing.



6

Mission Street BART Stations

Proposed Bus Stop and Waiting Shelter Locations

Civic Center and Embarcadero BART/Muni Interchange

Problem

The design of the BART and Muni subways under Market Street makes no provision for passengers wishing to transfer between one system and the other except via the mezzanine level. This requires a passenger to pass through three levels of the station, and to move from the BART to Muni fare collection areas at the mezzanine level. Provision of a direct stairway or escalator interchange connection would reduce this to a single change of level.

Recommendation

Immediate construction of direct interchange stairways and exit and entrance gates at the two potentially important interchange stations -- Civic Center and Embarcadero (see Figures 7 and 8). For a minimum solution, Civic Center installation would be marginally cheaper due to an existing stairway, and would serve the maximum riders.

Financial Summary

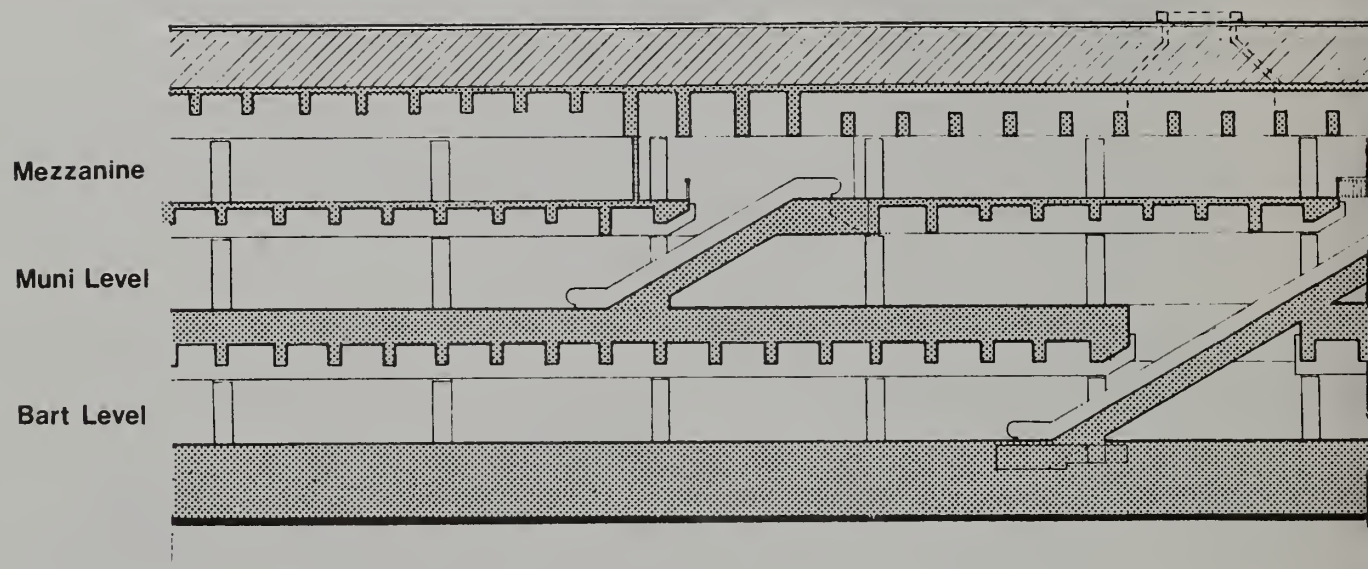
Capital cost (minimum facilities):

Embarcadero	$225,000
Civic Center	185,000
Total	$410,000
Maintenance cost	$ 10,000 per year

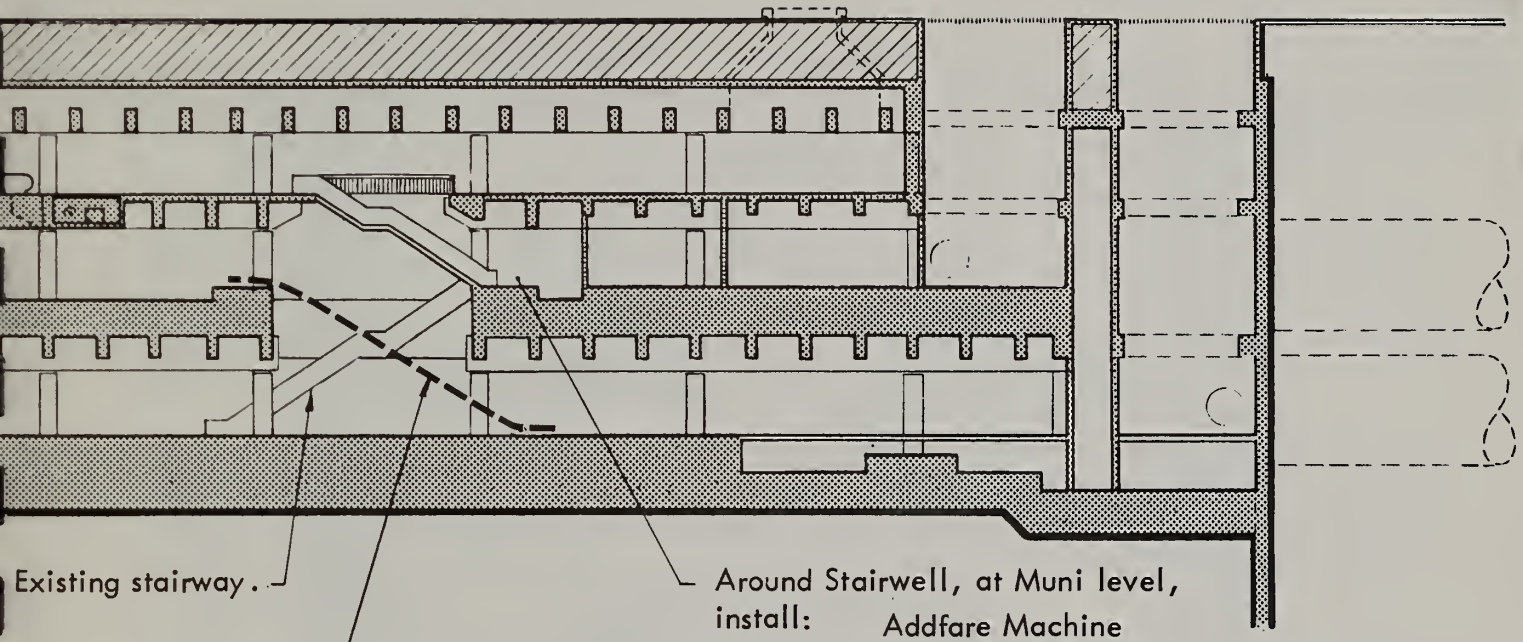
Analysis

There are four common BART/Muni subway stations under Market Street. With the present arrangements, passengers wishing to interchange between the two subway systems must go up to the exits at mezzanine level, cross the mezzanine, enter the other system and descend again to the trains. A stairway through one level, and an exit-entry gate system could eliminate this inconvenience. Both Powell and Montgomery stations have high levels of use projected for them; therefore it seems reasonable to avoid loading interchange traffic on them. Civic Center and Embarcadero stations are the logical candidates.

Computer simulation of transit activity patterns (De Leuw, Cather & Company network analysis using BATSC data) indicates the following interchange movements. Special occasions, such as events at Kezar Stadium or Golden Gate Park, could generate higher numbers.

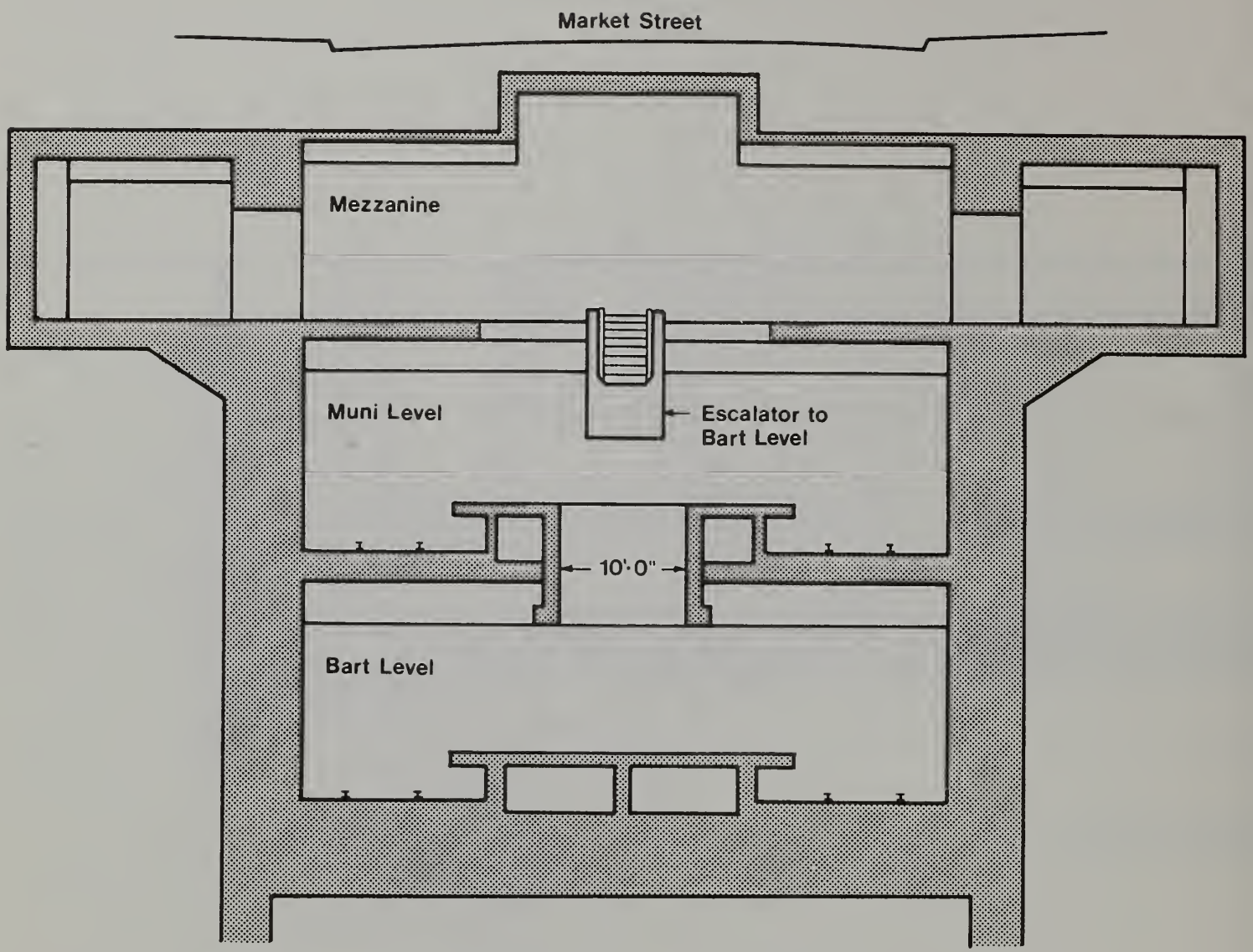


Note: Existing stairway shown as adapted for "minimum solution" of the BART to Muni Metro (and vice versa) Subway Interchange. By installing all fare equipment on the Muni level, the existing function of the stairway (part of the BART paid area) is unchanged.



7

Longitudinal Section of East Half of Civic Center Station



Note: If the escalator is offset to one side of the opening in the Muni Level, then a single stairway can be installed between the BART and Muni levels.

8

Cross Section of Proposed Embarcadero Station

	Trips (AM Peak Two Hours)	Trips (Daily)
Muni Metro to BART (to East Bay)	400 - 450	1,100
BART to Muni Metro (from East Bay)	200 - 250	1,100
Muni Metro to BART (to Mission Corridor)	25 - 30	75
BART to Muni Metro (from Mission Corridor)	8 - 10	75

A maximum interchange traffic of 480 passengers in two hours in the peak direction may be expected. Assuming the peak hour flow is two-thirds of the peak two-hour flow, the maximum hourly flow will be 320 in the peak direction, and 180 in the opposite direction. Passenger flow on this scale could be accommodated on a single four-foot-wide stairway such as exists at Civic Center, though such a stairway would be constricting, particularly to baggage-carrying passengers.

Although Civic Center Station has been finished, smooth flow between BART and Muni levels could be achieved without major modification. The Embarcadero Station finish contract has not yet been let, and changes can therefore still be made within the limitations of the present structure. It is, therefore, of paramount importance that a swift decision be made for any design change.

If choice must be made between providing interchange at either Embarcadero or Civic Center, Civic Center offers the following advantages:

- It can accommodate all movements, including expeditious handling of 150 transfers per day between the Mission BART Corridor and Muni Metro.
- A stairway has already been constructed which would be suitable for BART/Muni transfer.
- Civic Center has seven-foot wider platforms than Embarcadero.
- Civic Center interchange would be marginally less expensive than Embarcadero Station.

Embarcadero Station could accommodate all but 150 trips per day (those between Mission BART Corridor and Muni Metro). Although the Embarcadero Station transfer would assure BART passengers coming into San Francisco a seat on Muni Metro, other Muni passengers would be forced to stand. Although some cost savings can be effected by incorporating a

stairway in the Embarcadero finishing work, most cost is attributable in exit gates and other machines associated with ticketing.

Civic Center Options

Physical possibilities at Civic Center are as follows. There are two stairwells in the station, at Lines 4W and 6E. Each was designed for two stairways, but contains only one. Any interchange must use these stairwell spaces, either by making use of the existing stairways or by installing new stairways or escalators in the vacant space in each stairwell. Entry gates, which accept coins or tickets, and a transfer machine would need to be installed at Muni level. By installing the ticketing equipment at the Muni level, use is made (in the case of the east stairway) of space not presently in the passenger waiting area, while the stairway remains part of the BART "paid" area with continuing access to the mezzanine level.

The simplest and least expensive solution would be to use one of the existing stairways, and install the necessary gates, ticketing equipment and signing for two-way movement on this stairway. More elaborate schemes would be to use both the existing stairways, one up, one down, or to install an up escalator in one of the vacant stairwell spaces.

For passenger control, the single stairway will require at least four BART entry/exit gates for three aisles (one in, one out, and one spare) and a transfer machine. Since at least 30 per cent of the passengers are not expected to have a valid BART ticket, the addition of an Add Fare Machine, a Ticket Machine and a change maker machine should be considered. BART gate capacity is 1,200 to 2,400 passengers per aisle per hour; a single aisle in each direction will suffice.

Cost Estimate

Minimum interchange facility at Civic Center, using existing stairway:

Four BART entry/exit gates at $35,000 installed	$140,000
Two transfer machines (Muni to Muni) at $2,000 installed	4,000
Railings, signs, etc.	10,000
Surveillance camera	2,000
Design and contingencies at 20 per cent	29,000
Subtotal	$185,000

Additional equipment for maximum convenience for all interchange passengers:

Ticket machine at $40,000 installed	$ 40,000
Two change machines at $3,000 installed	6,000
Add fare machine at $34,000 installed	34,000
Subtotal	$ 80,000
Total for complete minimum facility	$265,000

If installation is postponed until after BART opens, the installation element of the cost (as opposed to the machine cost) could be expected to double, giving a total of over $300,000. Installation of an escalator instead of utilizing a stairway would cost an extra $60,000.

The recommended additional equipment is only a minor addition to that already installed throughout the system. Additional maintenance costs are unlikely to exceed $5,000 per year.

Embarcadero Station Options

Because the Embarcadero Station is still incomplete, more design options are still open. There are currently single 48-inch-wide escalators planned from the mezzanine to BART at Lines 11E and 21E. These pass through the Muni level with a ten-foot opening. If these escalators were offset to one side, it would be possible to install additional narrower escalators or stairways through each opening to connect the BART and Muni levels. If the escalator is not installed off-center, the option of future stairway installation at this location will be closed. As at Civic Center, each connection would need at least two BART gates and a transfer machine.

A possible solution could be to provide stairways at each end of the station, one up and one down. These would require the same entry and exit gates and transfer machines. The advantage of this second arrangement would be that it would pass through the existing Muni floor openings at each end of the Muni platform, and require less change in the present plans for the station.

Cost Estimate

The cost of facilities for a single, two-way stairway interchange at Embarcadero Station would be of the same order of magnitude as at Civic Center Station, but would have the cost of the stairway itself added, $40,000.

REROUTINGS

33/41 Line Improvement and Folsom/Howard Transit Lane

Problem

The historical development of the Muni system and the coming of one-way streets has created a pattern of scattered, one-way routes for the 41 and 33 lines between lower Mission Street and the Freeway. Such routes are difficult to utilize, and complicate the transit riders' trips far more than the auto drivers'. The planned re-electrification of the 41 Line on Folsom Street will give one-way trolley bus service on Howard, Folsom and Harrison Streets, each route with low patronage and unutilized equipment.

The abandonment of the 41 Line, and the 33 Line east of the 16th Street BART Station, would inconvenience few patrons, and save some $400,000 per year, as well as the re-electrification costs resulting from the Howard/Folsom one-way pair. To perpetuate the lines as they now run provides a poor return for the subsidy provided. However, abandonment does not appear politically acceptable (Board of Supervisors position against abandoning trolley coach service).

The alternative to abandonment or continued poor return for the transit dollar is to make service and routing improvements so that these lines become more useful components of the City's transit network.

Recommendations

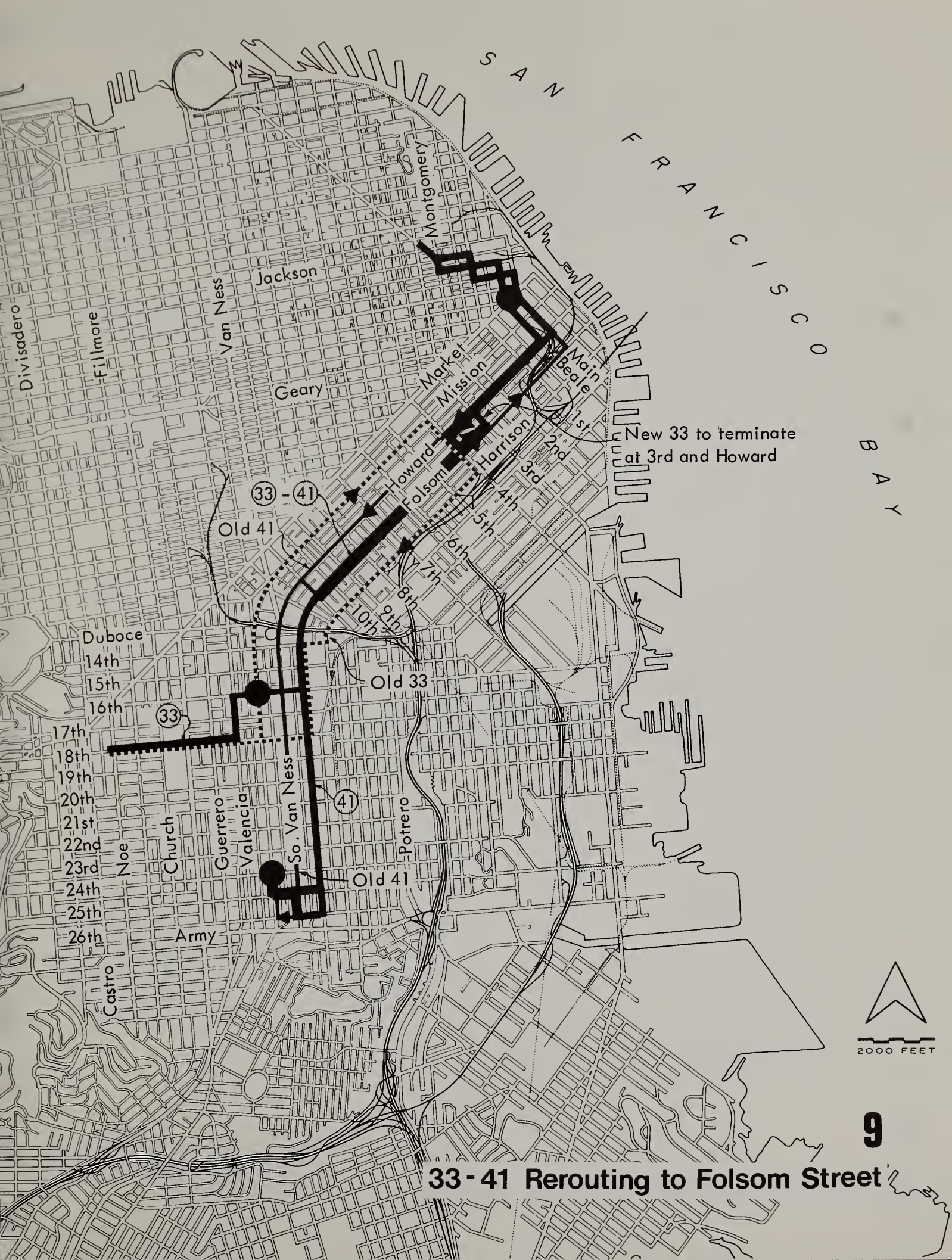
Provide a reverse-flow lane for Muni service on Folsom between 11th Street and Fourth Street, and on Howard Street between 3rd Street and Fremont Street. Re-route the 41 Line to run both ways on Folsom Street between 24th Street and 4th Street, and both ways on Howard Street between 3rd Street and Beale Street. Re-route the 33 Line to run both ways on Folsom Street between 16th Street and 4th Street. (See Figure 9-11). Although there would be some initial readjustment of vehicle traffic circulation attributable to the transit lane, traffic circulation would not be seriously impaired.

Financial Summary

Capital cost $204,000; revenue $30,000-50,000 per year.

Analysis

Experience in other cities indicates a loss of transit patronage may be expected when a one-way street system is introduced. The size of this loss depends upon the amount of separation between the two directions, and the transit and non-transit alternatives available. In London studies have shown patronage losses of 30 per cent following the introduction of one-way schemes.



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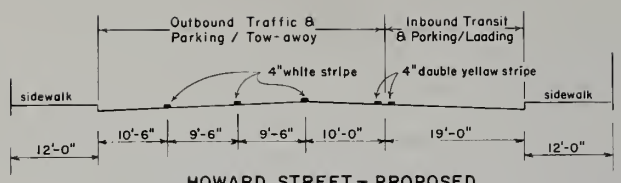
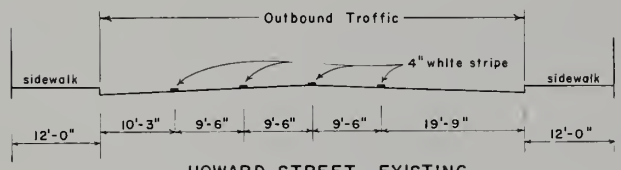
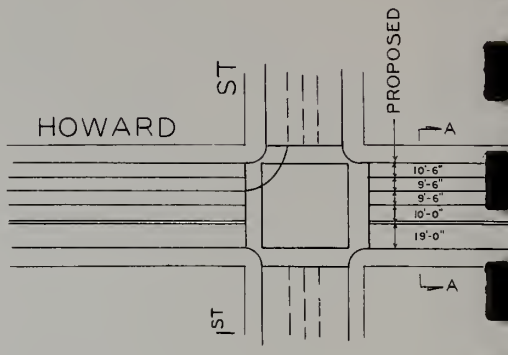
33 - 41 Rerouting to Folsom Street

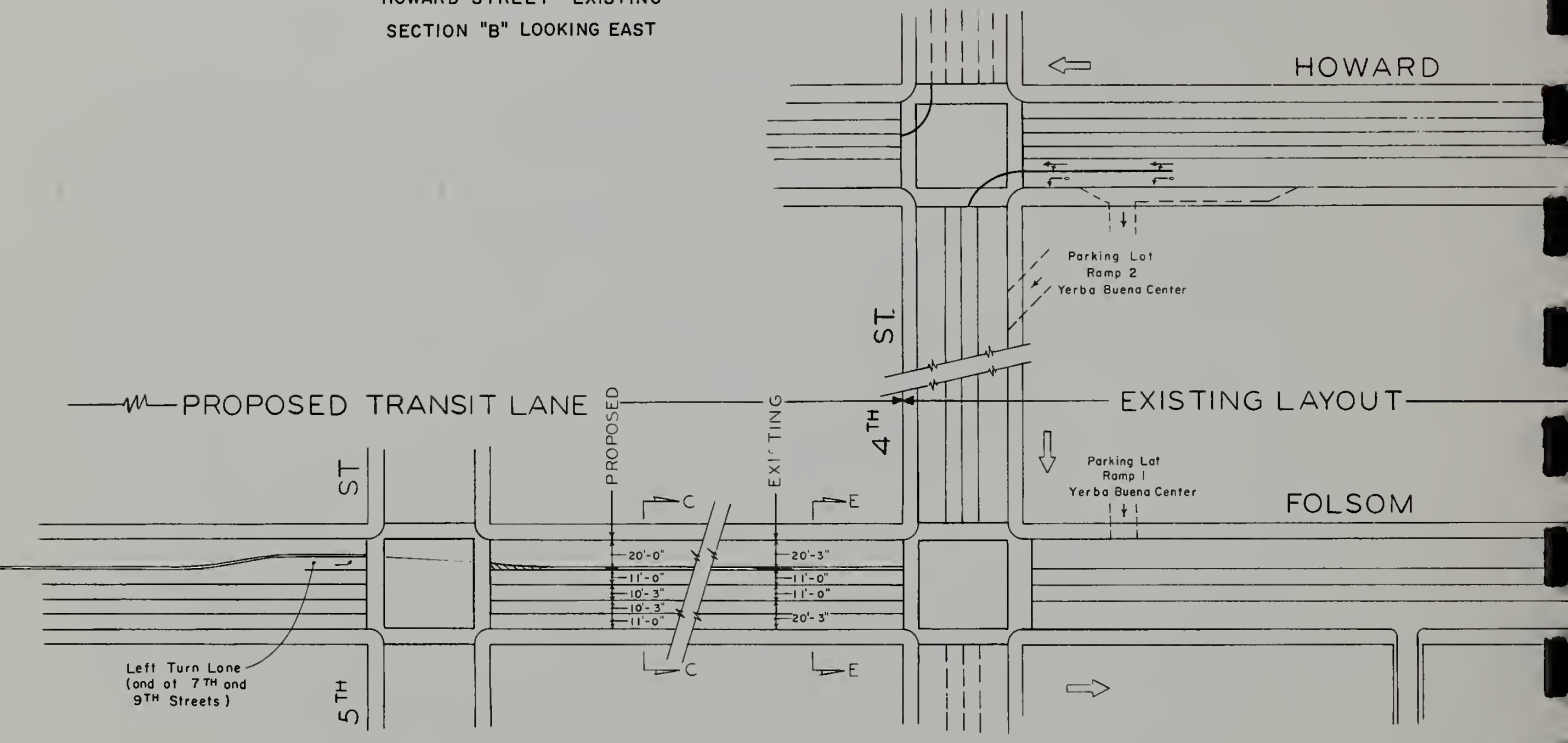


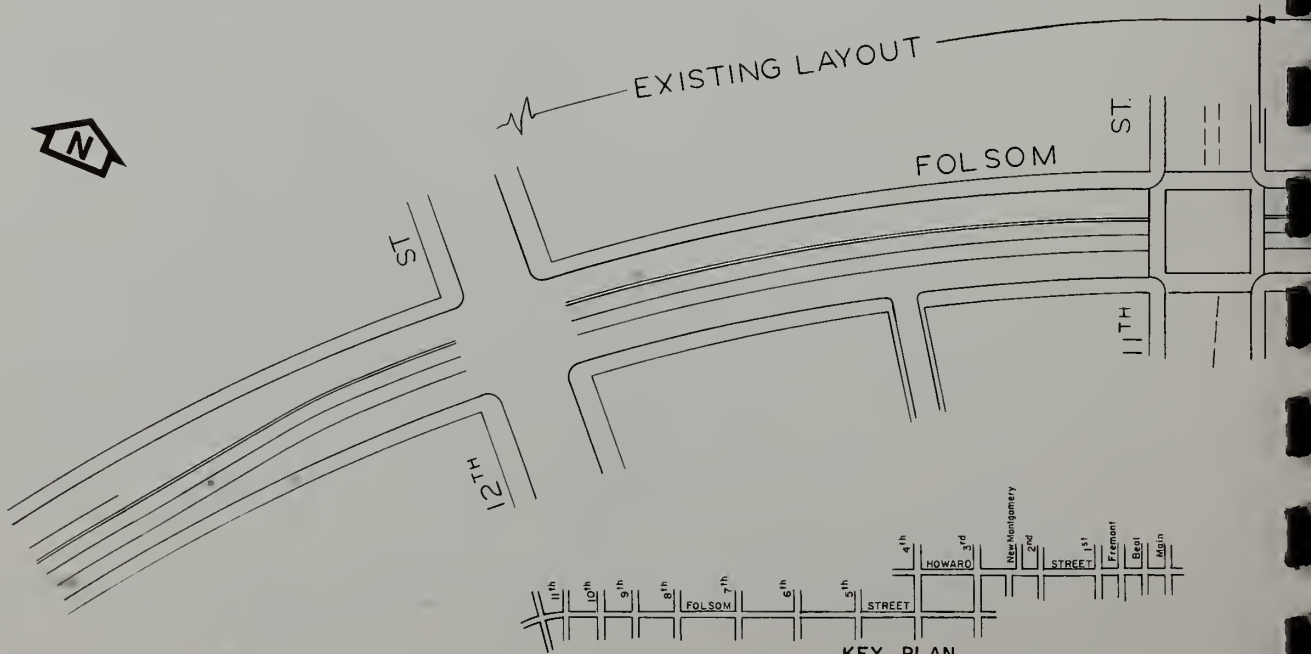
HOWARD STREET – PROPOSED
3RD STREET TO FREMONT STREET
SECTION "A" LOOKING EAST



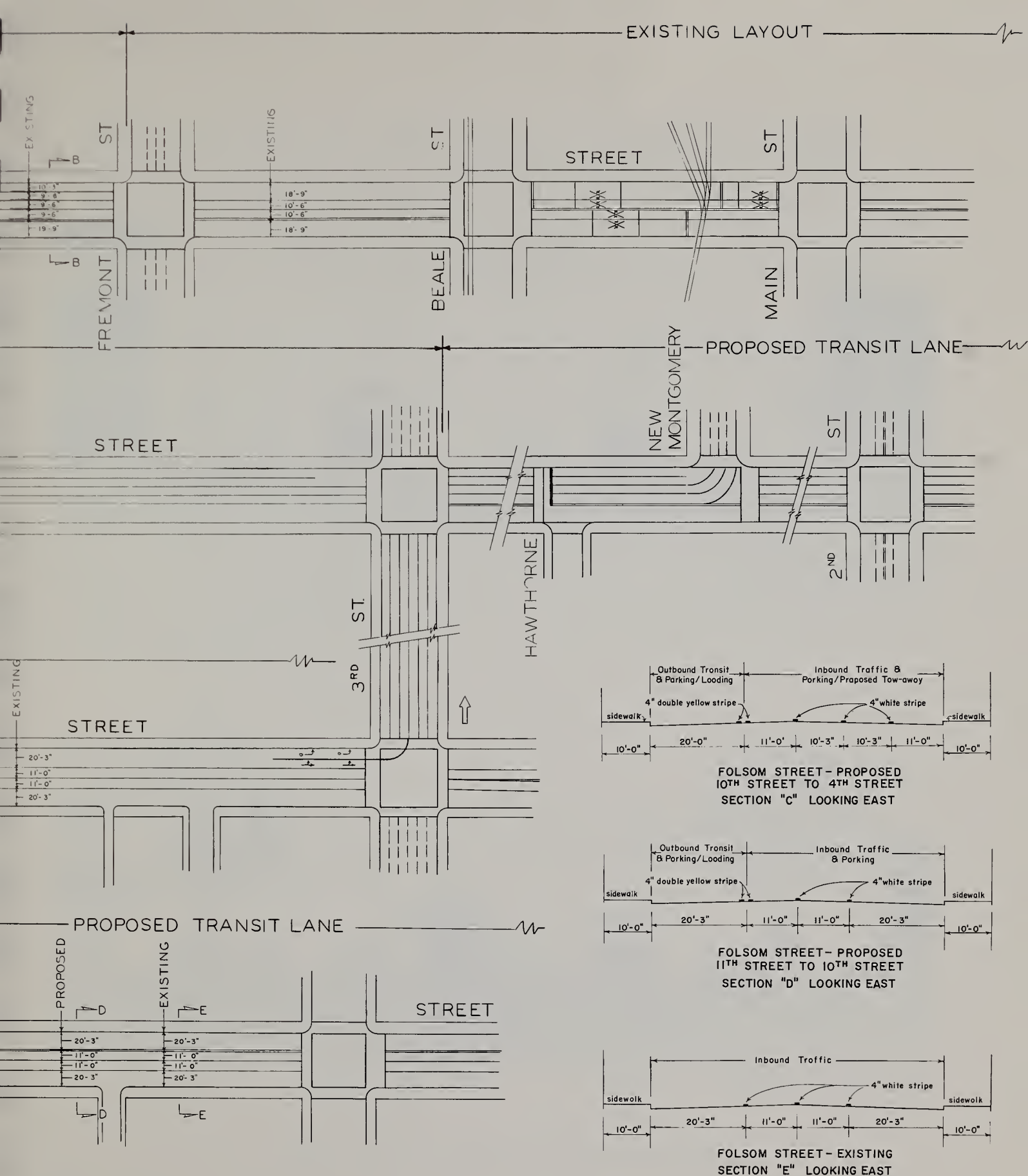
HOWARD STREET – EXISTING
SECTION "B" LOOKING EAST





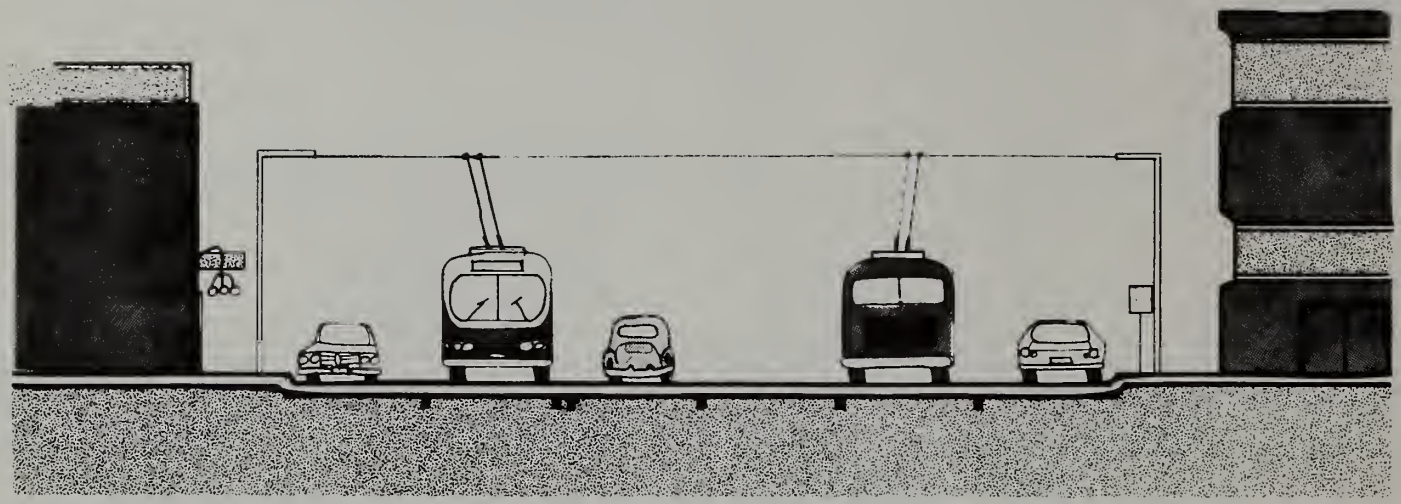


KEY PLAN

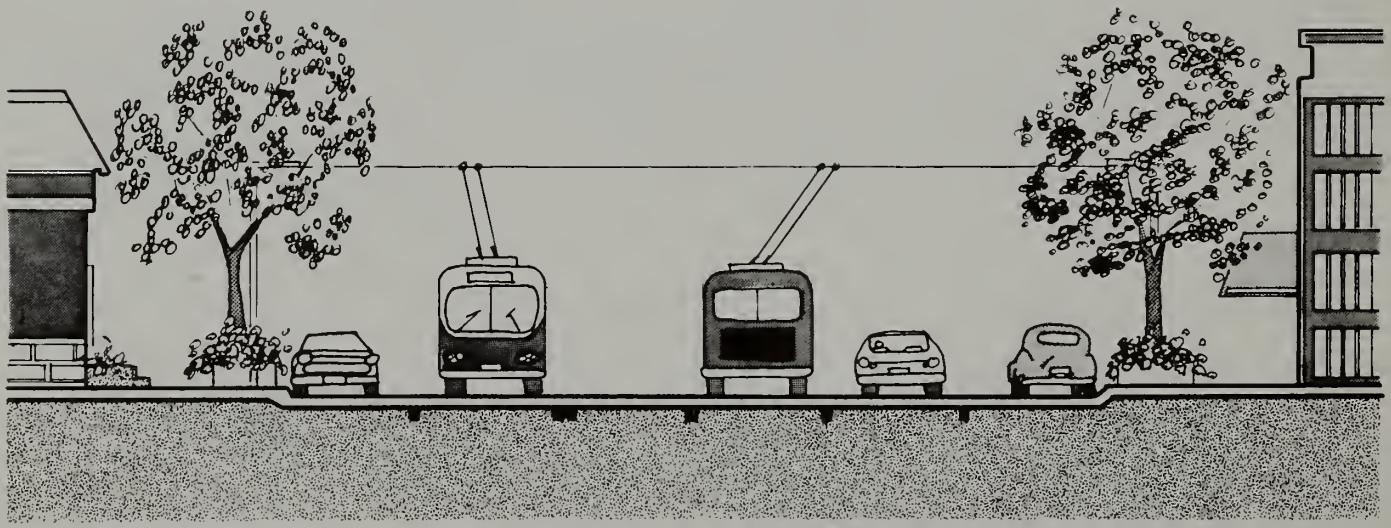


10

Folsom · Howard Transit Lane Layout



Inner Folsom Street
41 · 33 Revision



Outer Folsom Street
41 Revision

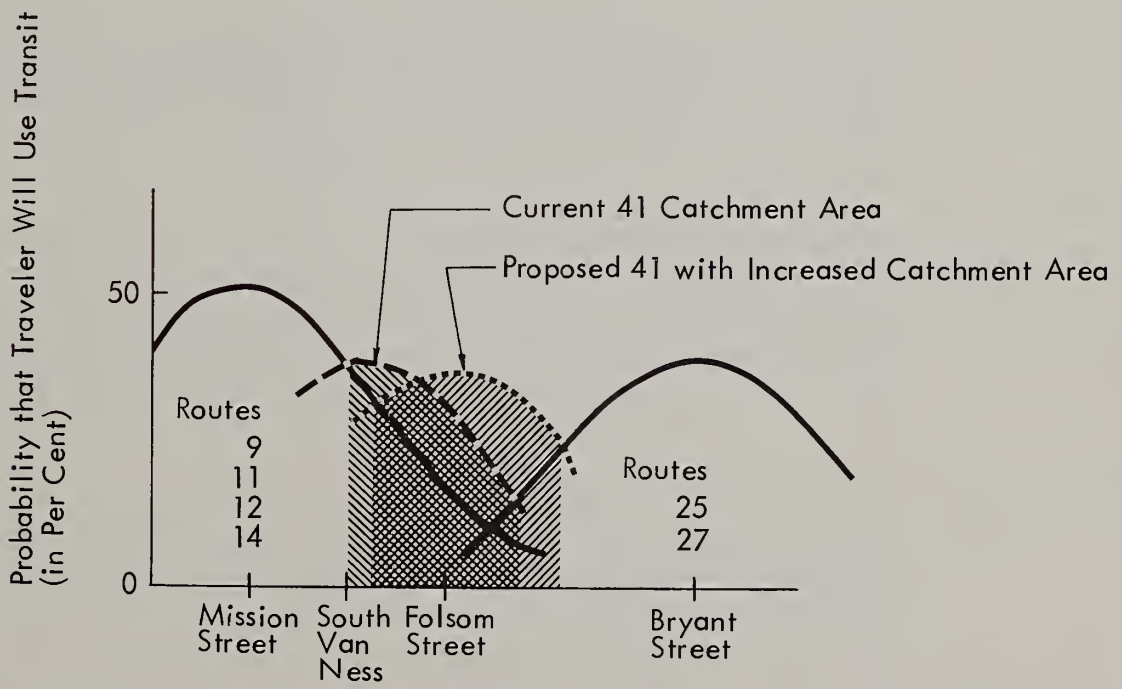
11

Folsom Street Cross Sections

The South of Market area contains small businesses with some residential use, including Clementina Towers. Much of the area is undergoing redevelopment, including the Yerba Buena Center, and may be expected to generate higher transit patronage when construction is completed. Folsom Street east of 3rd Street is largely freeway-oriented, so that the 41 Line should switch to Howard Street at 3rd Street to continue along the central axis of the patronage area. This also keeps the line away from the congested bridge approaches and closer to the Transbay Terminal, fits in with the traffic flow pattern between 3rd and 4th Streets and saves up to $100,000 by using existing wiring on Howard Street east of 3rd Street.

The outer portion of the present 41 Line is dominated by the low-headway Mission Street lines and jitney service. However, to the east of Folsom lies a densely populated residential strip 2,000 feet wide without a radial transit line. Moving the line to Folsom will put it in the center of the patronage "catchment" area between Mission and Bryant (See Figure 12). Relocation of the 41 Line from South Van Ness to outer Folsom is viewed as a part of an overall package for neighborhood improvement, including eliminating South Van Ness overhead wires, planting street trees, and ending towaway zones. Meanwhile, new 41 Line wiring on Folsom should feature underground feeder cables and attractive poles.

The 33 Line goes inbound on Mission Street and outbound on Harrison Street three blocks or 1,500 feet apart. Its present terminus at 4th Street is largely an area of parking lots. Its off-peak headway of 24 minutes maximizes inconvenience, in the absence of published schedules. A missed trip at this headway can cause almost an hour's wait. These factors contribute to the line's low patronage.



12

Drawing Power of the 41 Line in the Outer Folsom Area

The recommended 33/41 improvement and transit lane should be viewed as a demonstration in how transit can be upgraded and ridership increased. Once the initial demonstration has occurred, several additional options should be considered:

- Through-route the 33 trolley coach with 41 Union Service. This can be done operationally without additional equipment. Hence 33 Line service could be extended to the Embarcadero or 41 Union service extended to Yerba Buena Center.

- Extend 33 Line service north on 3rd and 4th into downtown, thereby increasing usefulness of the route.

- Terminating the 33 Line at the 16th Street BART station or Folsom Street, thereby eliminating 33/41 Line overlap in the inner Folsom Street area.

- Decreasing headways on the 41 Line and adding evening service, thereby increasing usage of the route.

Patronage

The present average weekday ridership is 1,600 on the 41 Line, and 2,800 on the 33 Line. Each element of the recommendation is expected to produce incremental patronage improvement:

- The consolidation of service on Folsom Street in the inner Mission will undo the damage caused by the one-way street system, and clearly identify the street on which a bus line can be found, in the same manner that Mission Street is now identified with transit. A rise in patronage of between 10 per cent and 20 per cent may be anticipated from this element of the improvement.

- The shifting of the 41 Line from South Van Ness Avenue to Folsom Street in the outer Mission will improve Muni service to the residents in this area, and may be expected to increase patronage by some 10 to 15 per cent. The opening of the new training school complex at Folsom and Fifteenth Streets and the redevelopment at and around the Yerba Buena Center will both generate new Muni patronage only if the service is clearly routed and the stopping places conspicuous.

- With the opening of BART, the 41 and 33 Lines will acquire new roles as BART feeders; the 41 linking the Folsom corridor to the Embarcadero Station, and increasing patronage by up to 15 per cent, and the 33 serving 16th Street Station, increasing patronage some 5 per cent.

To complement the service improvements, an informational campaign must be mounted to explain how the new routes will be better. This must include schedule cards, as outlined elsewhere in this report, to be distributed door to door along the route and adjacent streets. This is vital on long headway lines such as the 33 Line.

Traffic

The establishment of the Folsom/Howard Transit Lane requires the reversal of one traffic lane from Folsom Street between 11th and 4th Streets, and one from Howard Street between 3rd and Fremont Streets. Traffic counts of peak-hour flow have been made by the San Francisco Department of Public Works, and by De Leuw, Cather & Company as part of this study to determine the present traffic flow pattern (See Table 2).

There are two possible approaches to handling the auto traffic flow, that of equivalence, requiring that auto traffic capacity must not be reduced by the improvement of bus transit, and that of constraint which accepts that some reduction in the peak-hour auto flow on the streets is acceptable. Both have been analyzed and are presented here.

Inbound vehicular traffic increases on Folsom Street from 12th Street, where there are only two lanes, to 10th Street, where there are four lanes. Traffic counts made on Folsom Street just west of 9th Street, 7th and 4th Street indicate peak 15-minute flows just under 700 vehicles per hour are carried on this section. At this level the flow is heavy, but still free flowing. Turns are made at every intersection in at least one direction.

Outside the peak two hours, traffic is much reduced, and flows freely, sometimes on as few as two lanes due to construction obstructions or double parking.

To achieve equivalent traffic capacity with a reverse transit lane, a morning peak-hour towaway would be needed on Folsom Street between 10th Street and 4th Street, thus retaining four traffic lanes. The establishment of left-turn pockets at 9th, 7th and 5th Streets would improve the flow and safety characteristics of Folsom. Because of loading requirements near these intersections, these pockets would need to be short. However, with intermittent traffic in the reverse lane, little left turn storage would be needed.

Should it not be possible to introduce towaway on this section of Folsom Street, the reduction in capacity would produce congestion. Some traffic will shift to Bryant Street, two blocks away. Bryant Street, a five-lane street with no towaway, carries far less traffic than Folsom Street. It has ample capacity to absorb almost any Folsom surplus. Sending a driver two blocks out of his way is of little consequence to him. A transit passenger is seriously inconvenienced by having to go even one extra block for his bus.

On Howard Street, between 3rd and Fremont Streets, there are currently five lanes at the evening peak (one being a towaway) carrying less traffic than the four lanes on Folsom. The conversion of one lane into a reversed transit lane can therefore be achieved without exceeding the capacity of the street, and we anticipate no problem with this portion of the project.

Left turns across the transit lanes will be possible on Folsom Street at 11th, 9th, 7th, 6th and 5th Streets; and on Howard Street at 1st, 2nd and Hawthorne Streets. The major turning movements at Folsom and 3rd Streets and Howard and 4th Streets are not affected by the proposed transit lanes; but would be seriously impaired if the Folsom transit lane were continued further east on Folsom.

Table 2
SUMMARY OF TRAFFIC COUNTS

Location	Date	24 Hour Total	Peak One Hour	Peak 15 Min.	Comment
FOLSOM (Eastbound) 4 lanes West of 9th Street	Wed. 6 Dec. 1972	-	2,495 (a. m.)	689	4 lanes needed. Either towaway or diversion to Bryant
FOLSOM (Eastbound) 4 lanes West of 7th Street	Wed. 6 Dec. 1972	-	2,328 (a. m.)	605	4 lanes needed. Either towaway or diversion to Bryant
FOLSOM (Eastbound) 4 lanes West of 4th Street	Mon. 28 June 1971	15,232	1,930 (a. m.)	631	4 lanes needed. Either towaway or diversion to Bryant
BRYANT (Eastbound) 5 lanes West of 4th Street	Thurs. 8 July 1971	7,174	749 (p. m.)	214 (p.m.)	Far below capacity for five lanes.
HOWARD (Westbound) 5 lanes E. of 3rd St.	Tues. 5 Dec 1972	-	2,006	583	Within capacity of 4 lanes, even with 14% turning.
HOWARD (Westbound) 5 lanes West of 4th St.	Tues. 29 June 1971	15,594	2,136 (p. m.)	681	Illustrates capacity of Howard Street; not effected by transit lane.
HOWARD (Westbound) 5 lanes E. of 2nd St.	Thurs. 4 Jan. 1972	-	1,661	432	Make left lane left turn only, for 21% left turn traffic.

Source: San Francisco Department of Public Works
De Leuw, Cather & Company

Based on observations and counts of these left turn movements, we recommend short left-turn pockets on Folsom at 9th, 7th and 5th Streets, for peak-hour turning movements of between 170 and 220 vehicles per hour. The light opposing traffic means that the turn-lane storage length need be minimal, avoiding interference with nearby curb loading at these locations (to provide space for the turn-lane curb parking/loading would have to be removed on one side of the street near the intersection). At 6th and Folsom Streets, with a peak left turn of 122 vehicles per hour, and no room for a turn lane, a peak-hour turn prohibition should be considered. Left turns at 11th Street are less than 20 vehicles an hour, and do not constitute a problem.

Questions of safety have been posed regarding the Folsom/Howard Transit Lanes. We point out that transit lane traffic will be light enough not to interfere unduly with left turn movements, and that drivers are familiar with conventional two-way streets. The only difference here is the offset centerline and the factor of predominant flow, not uncommon in San Francisco.

On Howard Street east of 3rd Street, the left turns at 1st, 2nd and Hawthorne Streets should be made from the left traffic lane, as is normal practice, because of the larger number of left turning vehicles (219 to 270 vehicles per hour) and the ample capacity of the remaining lanes for through traffic.

The application of limited traffic constraints should be considered in tandem with the current transit improvements on BART and Muni. The opening of BART will add up to 21,000 seats per hour of transportation capacity to the Mission corridor. This is more than all the people in autos now using the streets and freeway in the corridor. In practice, BART is expected to result in 2,000 less cars traveling the corridor in the peak hour (about two-thirds of the traffic now using Folsom). This presents the City with an opportunity to reduce traffic, and ensure that the reduction is not on the freeway, but on local streets. One element of an overall program of traffic constraint when BART opens might be to initiate the transit lane without providing a towaway zone on Howard Street. Consideration might also be given to reducing the present signal progression speed of 36 mph. in order to make Folsom Street less attractive as a freeway alternative. Developing a full program for through traffic constraint requires extensive analysis, which is outside the scope of the BART/Muni Coordination Study. However, the types of steps which could be taken include the abolition of the peak-hour towaway zones (South Van Ness, Valencia and Guerrero), reduced signal progression speeds, constraining freeway offramp flows in freeway congestion areas (e.g. Bernal cut), and revisions in the downtown parking rate structure so as to discourage peak hour commuting without penalizing shoppers and other short term users (A revised form of parking tax might be a tool to achieve this).

Use of Folsom/Howard Transit Lane by Local Traffic

The counter-flow transit lane would need to be open to traffic other than transit to provide access to property fronting the transit lane. Because the traffic signal progression is set for the peak direction only, through traffic will be discouraged from using the transit lane. We do not anticipate that the local access traffic will impede the bus service, provided the loading and parking laws are enforced, and loading zones are of adequate extent. Should a problem develop with through traffic, compulsory right turns at every block where such turns are permitted provide a possible means of protecting the effectiveness of the bus lanes.

This arrangement of reverse flow lanes can be observed working well and without confusion at both Folsom and 11th Streets and Howard and Fremont Streets, and streets with offset centerlines can be seen in many parts of the City.

Signalization

The present timing progression would remain unchanged on Howard and Folsom Streets. Certain intersection approaches would need additional signal heads to face the transit lane, but most already have them. The traffic signals on Folsom Street are timed for 36± mph eastbound and 12± mph westbound (the transit lane direction). Allowing one (nearside) stop per block, the westbound timing is close to the transit optimum, and enables easier bus progression in the counter-flow direction than with the flow, where every second or third signal is against the bus. The 12 mph-progression of the transit lane will discourage through vehicular traffic.

Electrification

The 41 Line is nominally a trolley bus line. After Howard Street became one-way the 41 Line switched to diesels, until extra wiring could be installed for the one way inbound leg on Folsom from 11th to Main Street. Hetch Hetchy funds are commited to installing this wiring. All the existing wiring is due for renewal under the Capital Improvements Program. The adoption of the Folsom/Howard Transit Lane will eliminate the need for the planned wiring on Folsom Street east of 3rd Street, and will require two-way wiring on Folsom Street west of 4th Street, instead of one way wiring. Two-way wiring is only 15 to 20 per cent more costly than one way, so that the transit lane section of this recommendation will actually cost less to electrify than is presently committed. It will also enable wiring to be removed completely from both Harrison Street and Howard Street west of 4th Street, instead of being renewed under the Capital Improvements Program.

The movement of the 41 Line from South Van Ness Avenue to Folsom Street in the outer Mission will require the wiring of Folsom Street from 11th to 26th Streets, four blocks of which are already wired. The wiring on South Van Ness Avenue could then be removed. It would seem that this work could be carried out under the Capital Improvement Program as an alternative to the renovation of the South Van Ness wiring.

Cost Analysis, Electrification on Folsom

11th Street to 4th Street (two way) 5100 ft. @$30	$153,000
Committed alternate, 11th Street to Main Street, one way, 8,500 ft. @$25	(212,500)
Total for Inner Mission Section	(59,500)
11th Street to 14th Street (two way) 1300 ft. @$30	39,000
14th Street to 18th Street (less 16th to 17th) 1800 ft. @ $6	10,800
18th Street to 26th Street, 4550 ft. @$30	136,500
Terminal loop, 1200 ft. @$25	30,000
Special work at intersections	30,000
Subtotal	156,800
Design and Contingencies at 15 per cent	23,200
Total Electrification Cost (above that now committed)	$180,000
Signing and Striping	20,000
Changes to signals (8 extra leads @$500 each)	4,000
Total Cost of Recommendation	$204,000

Operating Cost

This proposal is not dependent on routing extensions or headway reductions, and will therefore involve no additional operating cost.

Policy

At the start of this project a wide range of citizens, neighborhood, and merchants organizations were polled as to their opinions concerning goals and objectives to be sought in this project. Most significantly they included:

- Encourage greater use of public transit as an alternative to the auto.
- Simplify transit routing, give priority to Muni buses on City streets, and speed up Muni service wherever possible.*
- Provide well-planned Muni feeder service to BART stations.*
- Reduce pollution and noise (favor electric and low-polluting vehicles).
- Improve the locations of bus stops.
- Make Muni more understandable.
- Get maximum transit service for each dollar spent.

*Except the Jitney Owners Association

In addition, the City's plan for transportation includes a number of policy declarations designed to enhance the position of transit in its competition for traffic and street space with the auto.

The Folsom/Howard transit lane/re-routing proposal has been developed in response to these often repeated declarations, to show how transit objectives can be achieved, and how two of the City's Muni routes can be re-invigorated.

Many other cities, faced with transit deterioration caused in part by one way streets, are now introducing comparable schemes. They include Louisville, Kentucky; Madison, Wisconsin; Honolulu, and many European cities. It is expected that transit preferential street treatment will become a common urban feature in the next few years.

Progress Monitoring

Because of the unusual nature of this proposal, and the widespread interest it is likely to attract in the transit industry, it is important that patronage be documented at intervals during the improvement, and public reaction analysed.

Straightening Route 47

Problem

The portion of the 47 Line trolley coach route between 16th Street and Market Street involves circuitus routing, undesirable on such a major route. In less than one mile, four switching movements are required northbound, and two southbound, resulting in loss of one to two minutes travel time and about a ten per cent probability of losing trolley poles. The problem is to take advantage of Hetch Hetchy funding to re-wire the 47 Line and of subway construction detours in straightening the route.

Recommendation

Straighten the 47 route to follow Potrero Avenue, Division Street, and South Van Ness Avenue (See Figure 13). The intersection of Howard Street and South Van Ness Avenue should be reconstructed and signalized to accommodate autos and transit turning movements (See Figure 14).

Financial Summary

Rewiring cost $100,000 (Hetch Hetchy); intersection improvements $50,000 (Public Works Department).

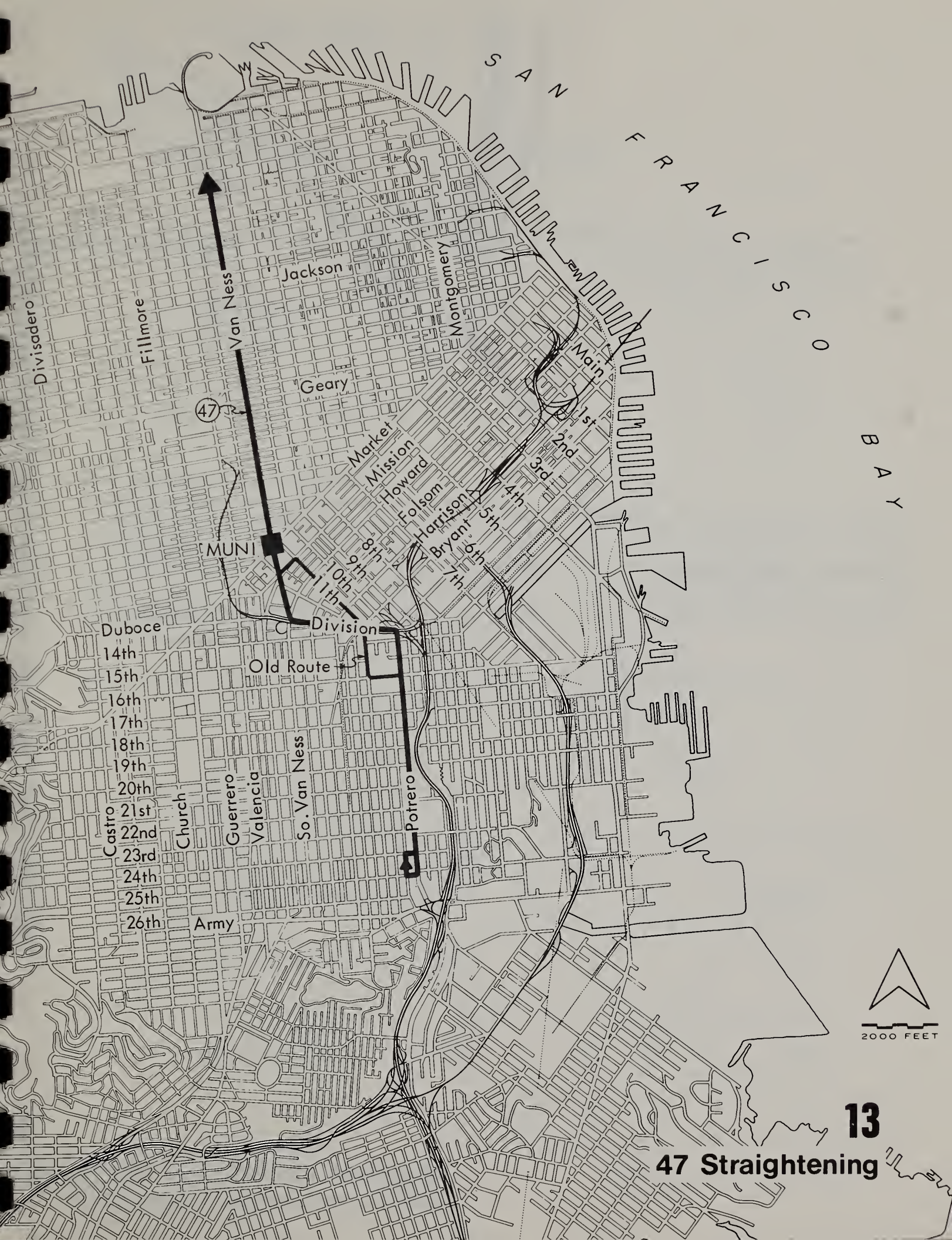
Analysis

Circuitus routing makes transit unattractive to the public, and tends to slow up its operation. The proposed re-routing would have trolley coaches stay on the route's principal streets, Van Ness Avenue and Potrero Avenue, as long as possible.

Approximately 250 vehicles, carrying about 3000 passengers, utilize the 47 route between Van Ness Avenue and 16th Street each day. A one-minute time saving in each direction, with passenger time worth about 1.5 cents per minute, yields $13,500 savings in ridertime each year. It is unlikely that vehicle time savings would be sufficient to permit eliminating a rush-hour run on the 47 route.

No loss in patronage is expected from shifting the 47 route from 11th Street to Division Street and South Van Ness Avenue. Land use along 11th Street includes auto repair shops and activities not conducive to transit usage. If anything, more patronage is to be gained by obtaining faster service on the 47 than would result from loss in 11th Street patronage or increase due to Division Street service.

Trolley poles are already in place on Potrero Avenue between 16th Street and Division Street, resulting in rewiring savings. The underside of the Skyway could be utilized to suspend wiring over Division Street. This will reduce wiring costs considerably.



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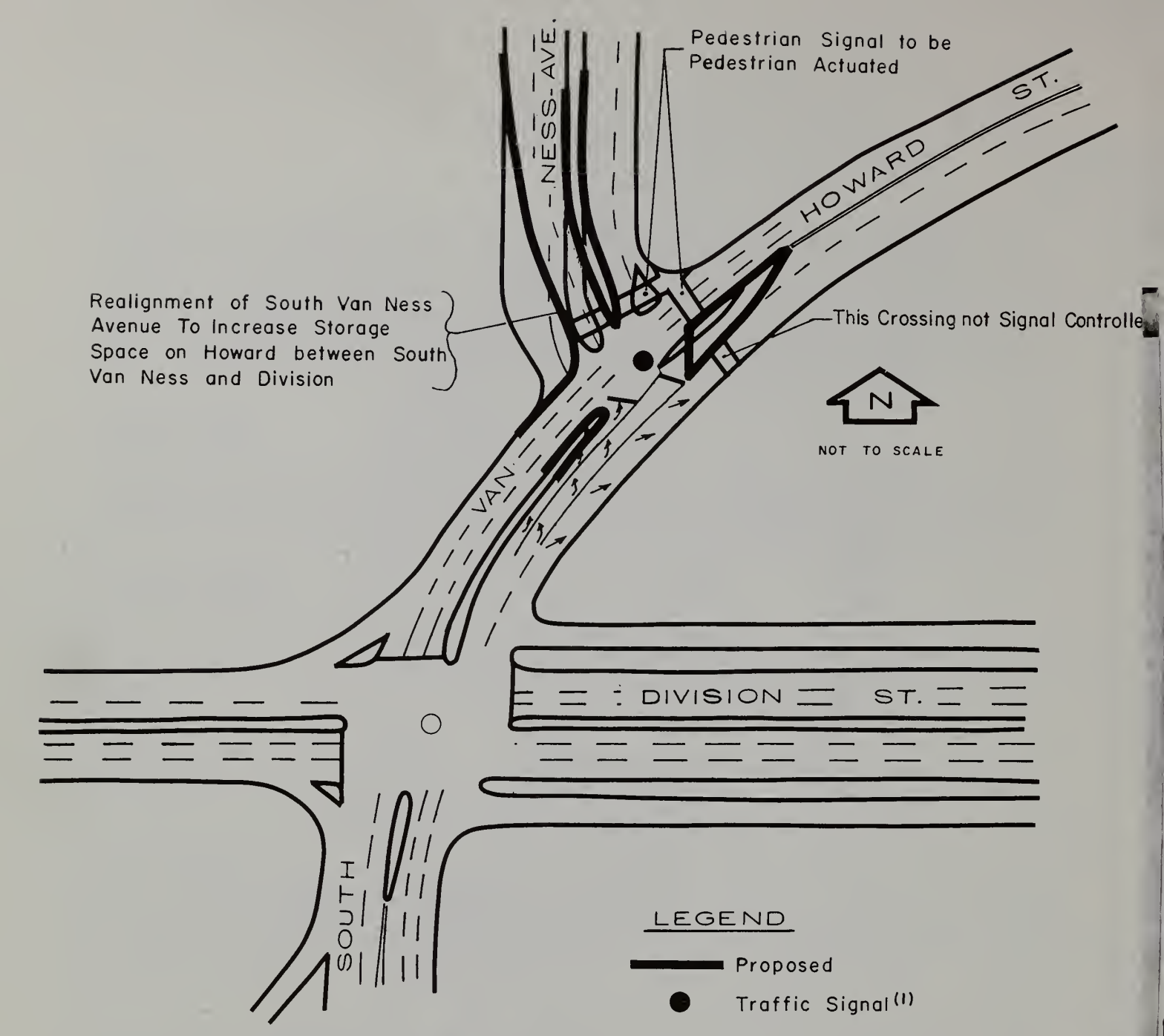
47 Straightening

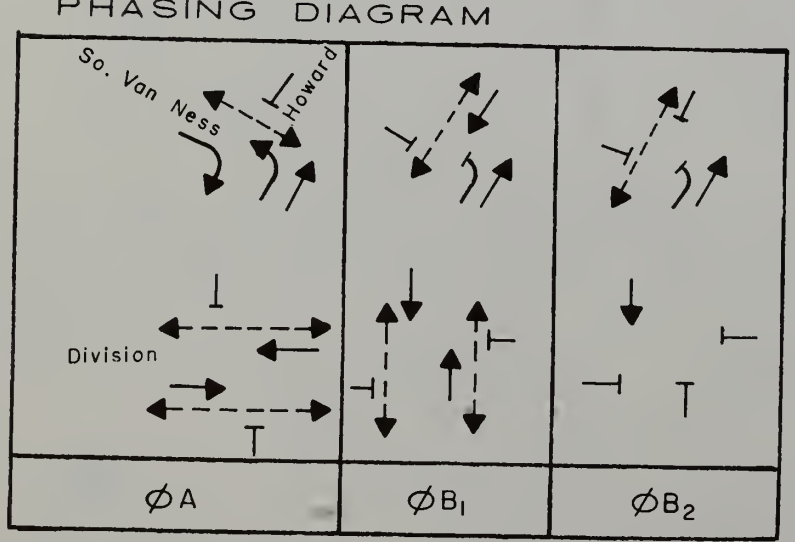

NESS AVE.
Pedestrian Signal to be Pedestrian Actuated
HOWARD ST.
Realignment of South Van Ness Avenue To Increase Storage Space on Howard between South Van Ness and Division
This Crossing not Signal Controlle
N
NOT TO SCALE
VAN
DIVISION ST.
SOUTH

LEGEND

- Proposed
- Traffic Signal (1)
- Existing Traffic Signal

(1) Inteconnect with Signal at Division and South Van Ness.

PHASING DIAGRAM



Vehicle Movement
Pedestrian Movement

Proposed Intersection Improvemen
South Van Ness Avenue & Howard Street

Cost Estimate

Rewire Potrero from 16th to 13th Street (existing poles)		
= 1 100 x $ 10		$ 11,000
Wire 13th Street from Potrero to Howard, under freeway		
= 2,700 x $15		40,500
Wire South Van Ness, Howard to Mission		
= 1,200 x $ 32		38,400
	Total	$ 89,900
Including design and contingencies, say		100,000

South Van Ness - Howard Intersection

To make a smooth trolley coach movement between Division Street and South Van Ness Avenue requires signalizaing the South Van Ness - Howard intersection. A three-phase signal is needed, synchronized with the existing signal at Howard and Division Streets. Re-construction of the South Van Ness Avenue approach to Howard Street would lengthen the distance between the two intersections, and facilitate movement between Division Street and South Van Ness Avenue.

Revision of the South Van Ness - Howard intersection is needed from the standpoint of better auto circulation alone. Transit would merely flow with the auto traffic.

Cost Estimate

Removing curb, gutter, island paving and asphaltic concrete in new intersection area	
Curb and gutter : 500 l.f. @ $1/1.f. = $ 500	
Island paving : 200 x 10@ 50¢/s.f. = 1000	
Asphaltic concrete: 1000 s.f.@ 50¢ = 500	
	2,000
Lighting relocation	
Assume 4 electronlier @ $1,000	4,000
New curb and gutter - 1,000 ft. @ $3 foot	3,000
New sidewalk - 300 x 10 ft. x 75¢/foot	2,500

Restriping		500
Allowance for drainage modification		1,000
Revisions to abandoned portion of Van Ness - assumed curb and gutter and asphaltic concrete removed and area to be landscaped		
Curb and gutter removal	$ 300 ±	
Asphaltic concrete: 1500 s f ±	700 ±	
Right of way: 0.3 ± Acre @ $20,000	6,000	7,000
Signal modification		20,000
		$ 40,000
	20% Contingency	8,000
	Total	$ 50,000

Express Bus Improvements

Problem

Modifications in express bus service could be implemented immediately to benefit Outer Mission Corridor transit users and to get better utilization of equipment. Although major revisions in express service do not appear warranted, with BART opening in San Francisco less than a year away, some minor revisions could speed up service and perhaps increase ridership.

Recommendation

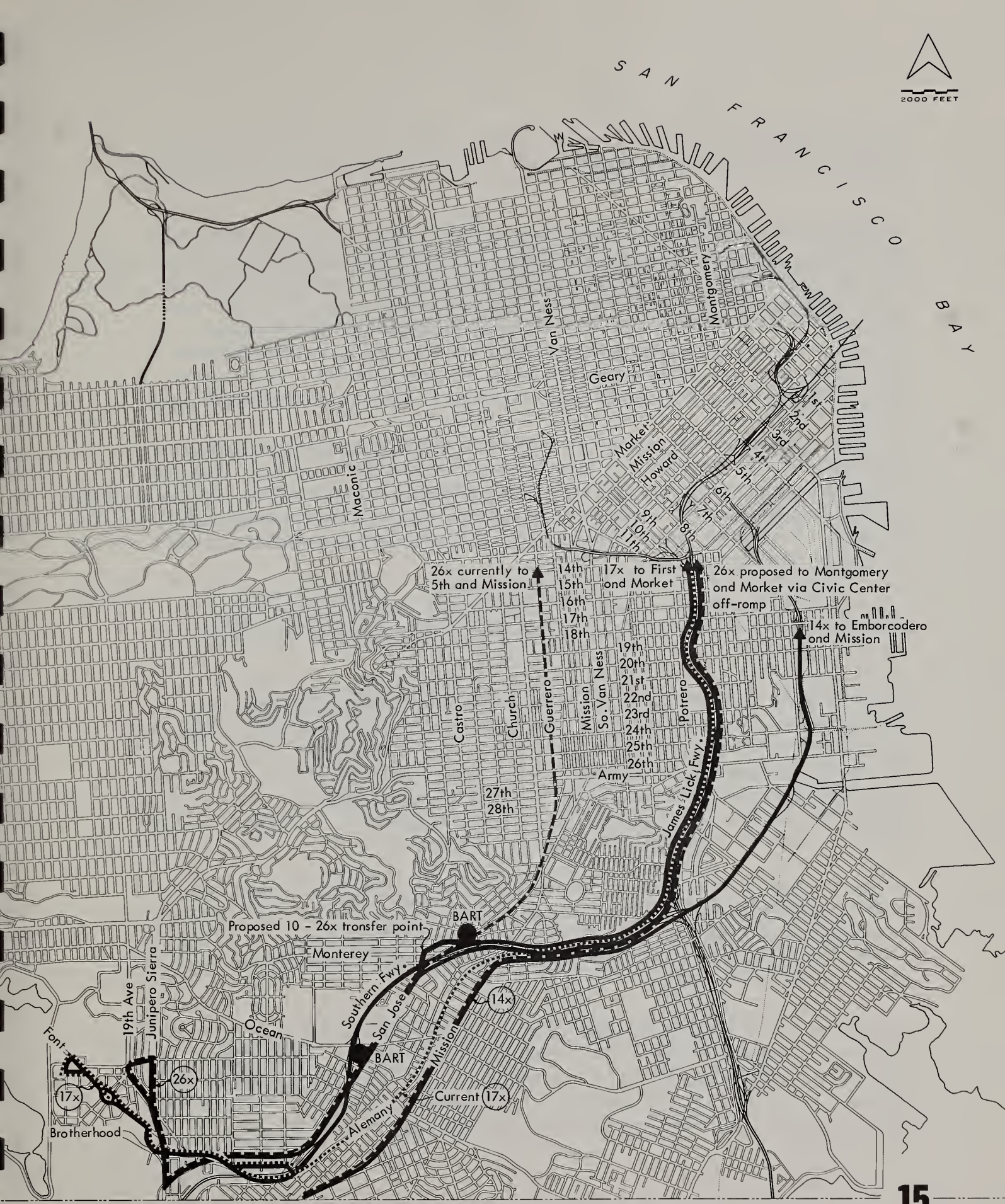
Service on the 17X and 26X should be speeded up via additional freeway routing. Routing the 14X via I-280 would avoid traffic tie-ups at the I-280 - Bayshore Freeway interchange. The 26X should be extended to downtown. (See Figure 15).

Financial Summary

No additional cost; $16,000 added revenue.

Analysis

Three express bus routes form the backbone of rush hour service between the Outer



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Express Service, 14x · 17x · 26x

Mission Corridor and downtown: the 14X, 17X and 26X. These routes help relieve overcrowding on high-volume streetcar lines -- the K, M, and to some extent, the J Line.

A BART/feeder bus combination is expected to supplant these express bus routes when BART opens. The 14X, 17X and 26X routes have an established patronage of about 2700 in the peak hour, representing a sizable share of BART's expected patronage in San Francisco. Transit experience shows the importance of a smooth transition from express bus to BART feeder bus in order not to lose passengers to the automobile. Ideally, passengers now catching express buses should be able to catch BART feeder buses at the same stop, at the same time, going the same direction. Express buses passing BART stations today would simply terminate at the stations when BART opens.

Extensive upgrading of express services in advance of BART opening was considered, but rejected due to the short time span between now and BART opening. Revisions requiring sizable expenditure, public hearings, administrative groundwork, and promotion would be a poor investment if express services would be abandoned within the year. It would be impossible to implement major revisions and reap full benefit within that timeframe.

As a substitute proposal, we recommend relatively minor improvements in express service, primarily operational in nature, designed to speed up service and perhaps increase ridership.

Routing the 26X on to the freeway at Monterey Boulevard and extending the route into downtown will require approval by the Board of Supervisors and scheduling revisions, but neither should pose a major obstacle. Mission residents prefer the 14GL and other alternatives as opposed to the 30-cent 26X that doesn't take them downtown. The 26X is generally viewed as a bus for commuters coming through the Mission, but not for local residents themselves. Local residents have registered opposition to diesel noise and could be expected to support putting the 26X on the freeway.

Currently, local 26 buses return to the yard after making morning runs, while 26X buses return for added runs. With extension of the 26X to downtown, scheduling might be switched so that 26X runs follow 26 local runs, and 26X buses return to the yard. In any event, it should be possible to add the 26X extension to downtown without need for new equipment or drivers.

All Mission Corridor express runs are currently operating with a load factor (ratio of passengers to seats) of less than 1.25 during the peak 15 minutes. With extension of the 26X into downtown the lines current load factor of 1.0 during the peak may be increased. No more than 100 additional riders are anticipated during the peak two hours on the 26X line. They could be accomodated on the existing headway:

	AM	Midday	PM
14X	7.5	-	5
17X Now	7.5	30	5
26X Now	15	-	10

Patronage: The 26X improvement would be the only one expected to attract new riders, most of which would be diverted from the current 10 Line - J Line combination:

- Time via auto from Monterey and Plymouth to Downtown — 25 minutes
- Time via 10 and J — 46 minutes
- Time via 10 and new 26X — 37 minutes

Assuming that 80 per cent of 10 Line peak two-hour load is work travel and 60 per cent of that is going downtown, approximately 120 riders go downtown. Of these, about 75 per cent might be induced to transfer to improved 26X.

Revenue: 90 in peak 2 hours x 2 = 180 daily riders

180 x 300 = 54,000 riders annually

54,000 x 30 cents = $16,200 annual revenue

TRANSIT LANES

First Street Improvements

Problem

The existing striped transit lane on First Street between Stevenson and Transbay Terminal is blocked by evening rush hour vehicular traffic approaching the Bay Bridge, particularly on Fridays. The problem is compounded by construction on the corner of Market and First Streets, which has blocked the parking lane and has created a high ramp in the street, which vehicles avoid. Buses at stops on First Street and on Market Street occasionally block auto traffic, which in turn blocks streetcars bound to the Transbay Terminal.

Recommendation

Place physical barriers beside and within the transit lane from Stevenson Street to the Transbay Terminal and along the east side of the lane from Stevenson to Market Street. Move three bus stops and channelize First Street north of Market Street (see Figures 16-18).

Financial Summary

Capital cost, $10,000. Public Works Department financing is envisioned, using gas tax monies.

Analysis

The concept behind the recommended improvement is to provide a greater degree of protection for the Muni-only lane, to expedite flow of vehicular traffic past the problem area between Market Street and the Transbay Terminal, and to push back some of the congestion to the intersection north of Market Street.

Curb barriers beside the transit lane will make it inconvenient for vehicles to cross over the lane and block transit during periods of congestion. Of particular concern is traffic coming out of Stevenson Street, crossing the transit lane to make a left turn on Mission Street. Diagonal curbs between the tracks will further discourage autos from using the lane or crossing over. These curbs would be between the rails only, to permit use of the lane by the 38 bus as well as by the streetcars.

Space between the transit lane and the east curb will be too narrow to accommodate both a moving traffic lane and parking lane for trucks. To meet this problem, it is recommended that trucks be required to park with their wheels on the curb. thus permitting traffic to pass. Should parking on the east side curb be unacceptable due to basements extending out under

the sidewalk, the same objective can be achieved by removing the physical barrier on the east side of the transit lane.

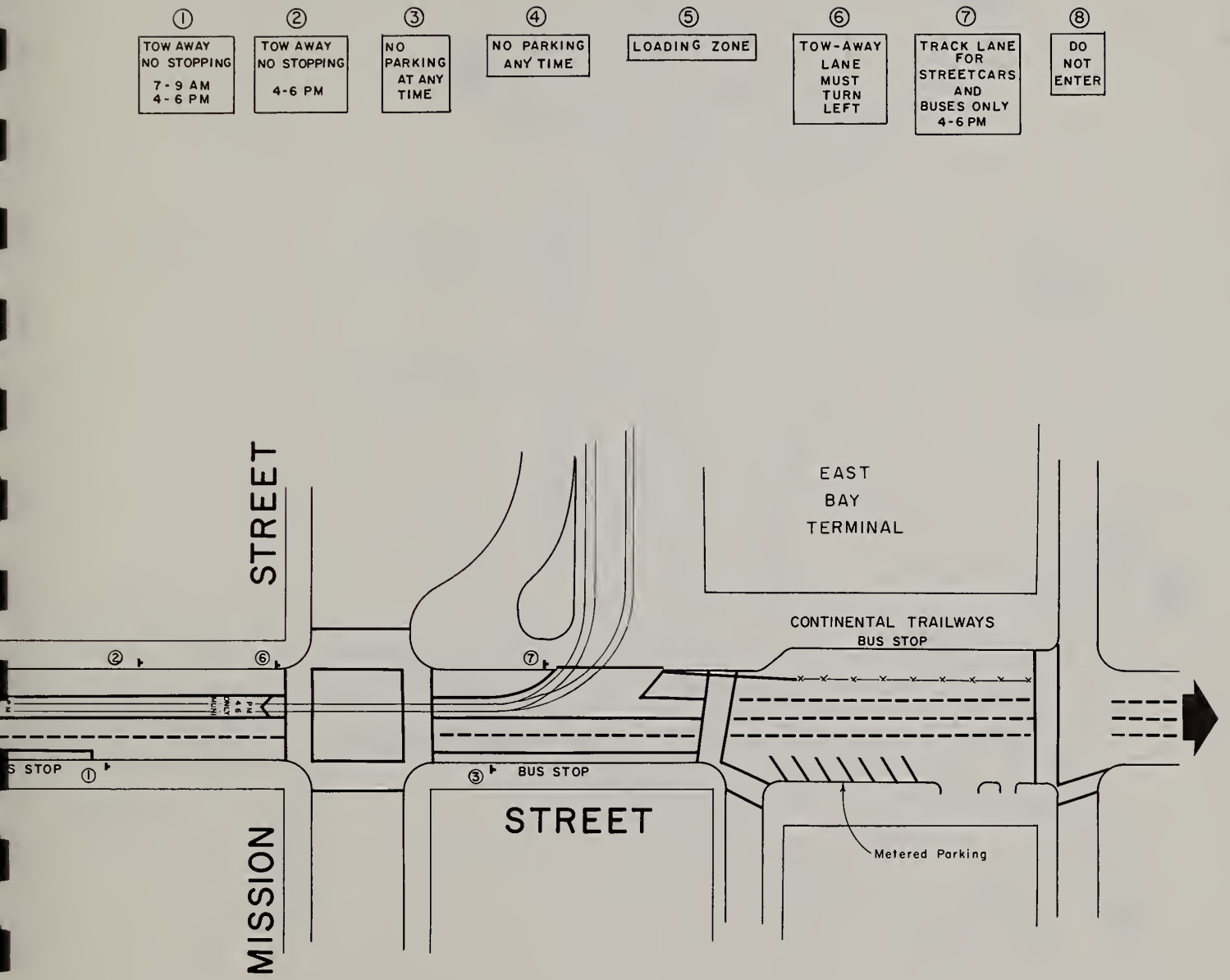
Traffic should be encouraged to sort itself before crossing Market Street. This can be accomplished by construction of an island in the street and signing "left lane must turn left at Mission".

Shifts in the location of bus stops are recommended to eliminate blocking of traffic by buses, which in turn blocks streetcars on their way to the Transbay Terminal. Sufficient space should be provided for two buses at each stop. Space immediately behind the bus stop should be kept free of parking for a third bus.

Cost Estimate

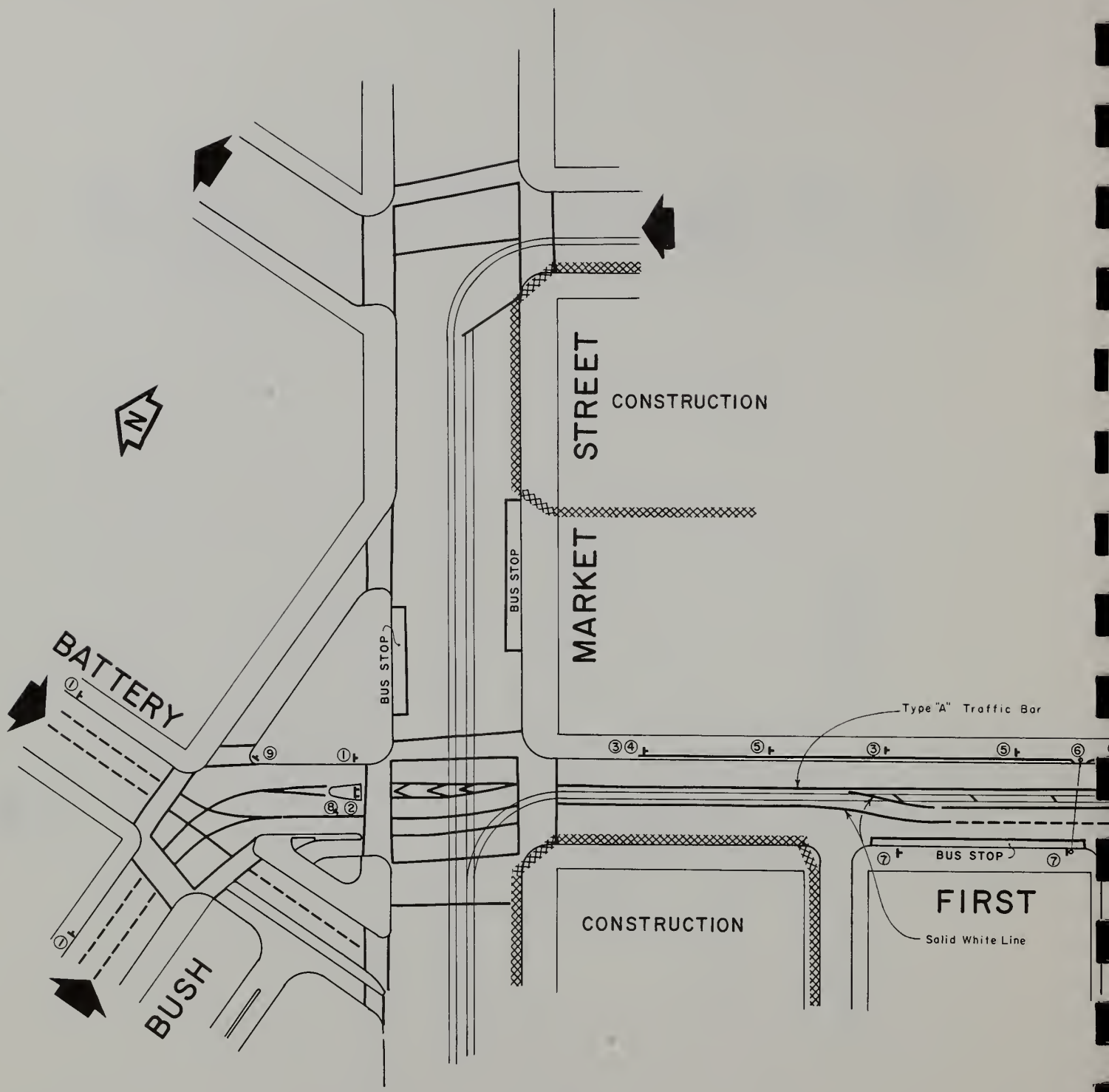
Signs	$ 2,000
Striping	1,000
Traffic Bars	5,000
Miscellaneous	1,000
Total	$ 9,000
Plus Design and Contingencies, Say	$10,000

N
MARKET STREET
CONSTRUCTION
BUS STOP
BUS STOP
CONSTRUCTION
BATTERY
BUS STOP
CONSTRUCTION
FIRST
BUSH


① TOW AWAY NO STOPPING 7-9 AM 4-6 PM
② TOW AWAY NO STOPPING 4-6 PM
③ NO PARKING AT ANY TIME
④ NO PARKING ANY TIME
⑤ LOADING ZONE
⑥ TOW-AWAY LANE MUST TURN LEFT
⑦ TRACK LANE FOR STREETCARS AND BUSES ONLY 4-6 PM
⑧ DO NOT ENTER
STREET
EAST BAY TERMINAL
CONTINENTAL TRAILWAYS BUS STOP
BUS STOP
STREET
MISSION
Metered Parking

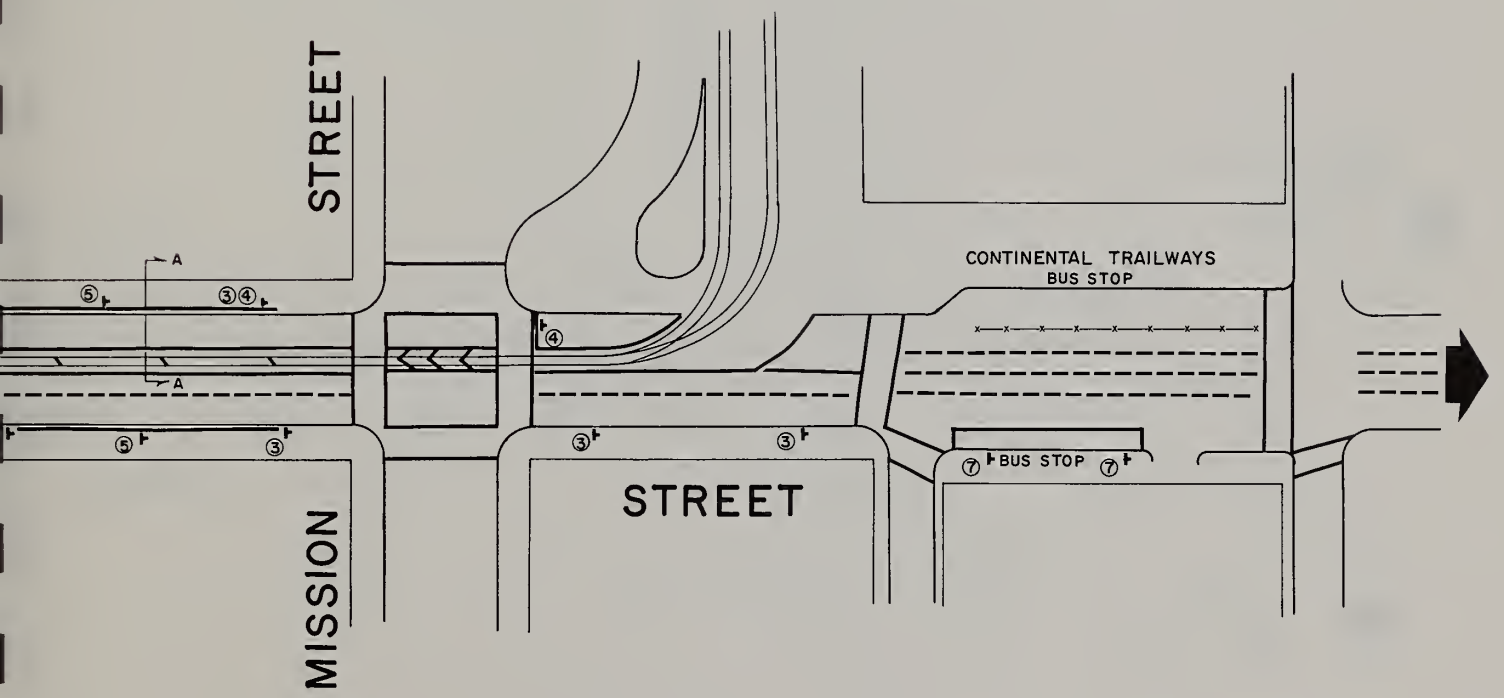
16

Existing First Street


N
MARKET STREET
CONSTRUCTION
BUS STOP
BUS STOP
BATTERY
BUS STOP
Type "A" Traffic Bar
FIRST
CONSTRUCTION
Solid White Line
BUSH

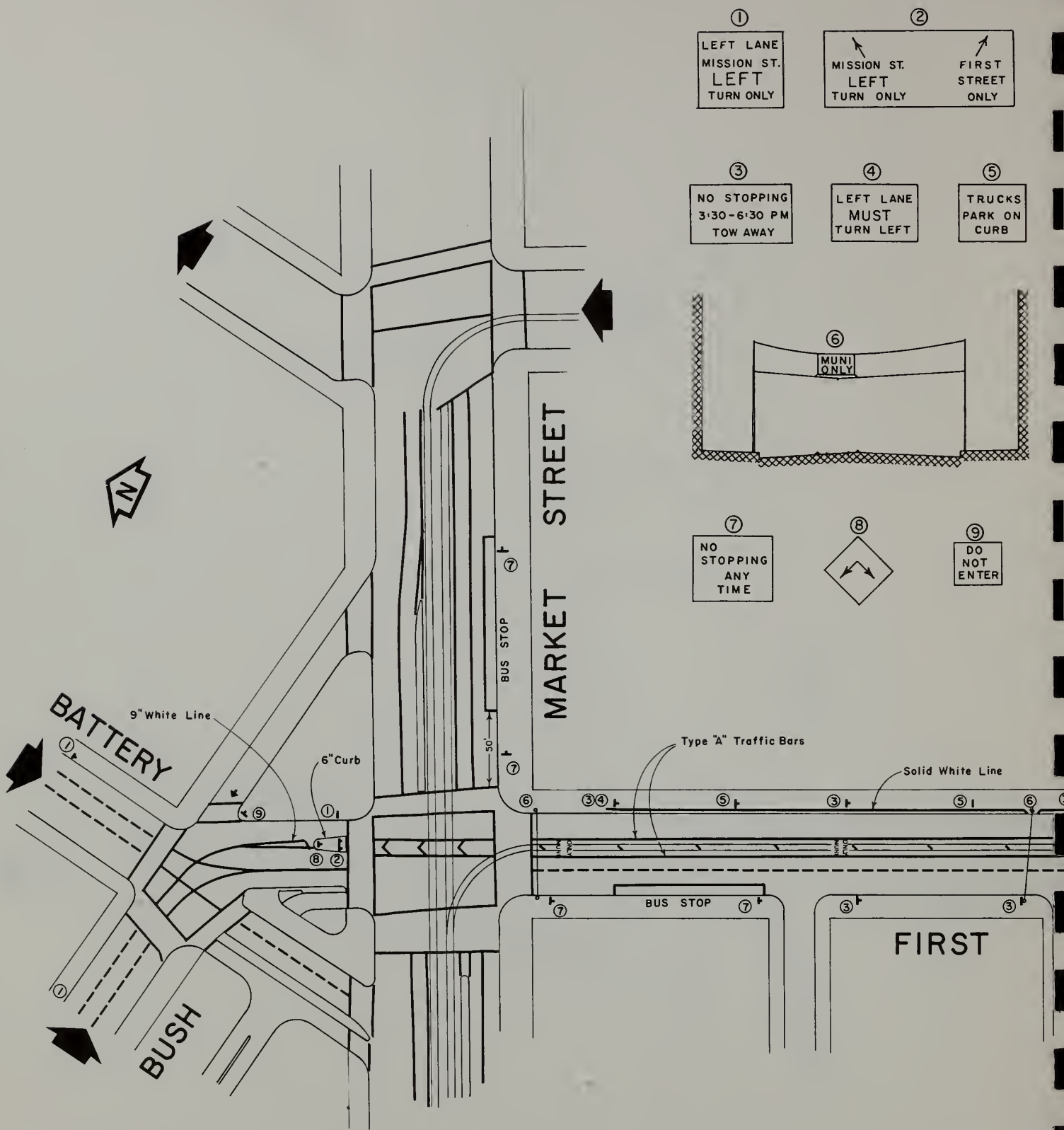
NOTE:

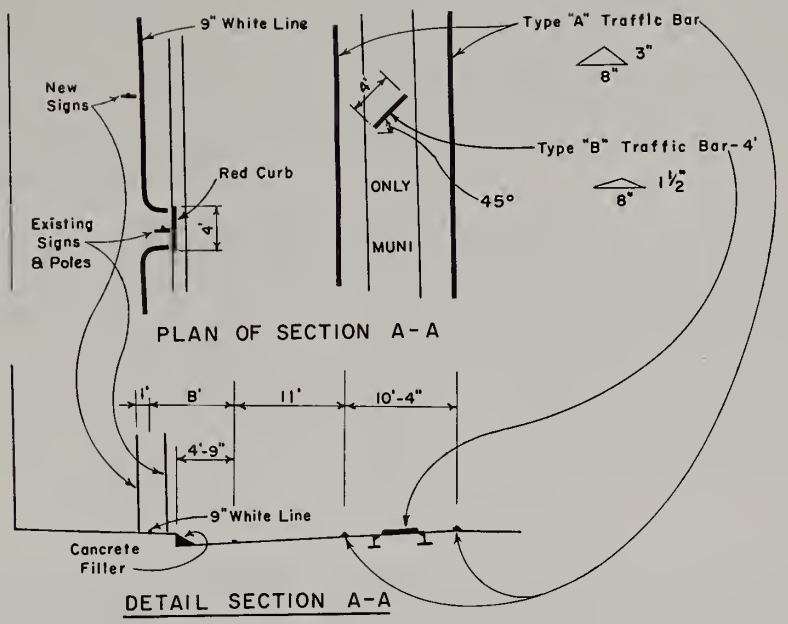
FOR SIGN LEGEND, SECTION
AND DETAILS SEE PHASE II

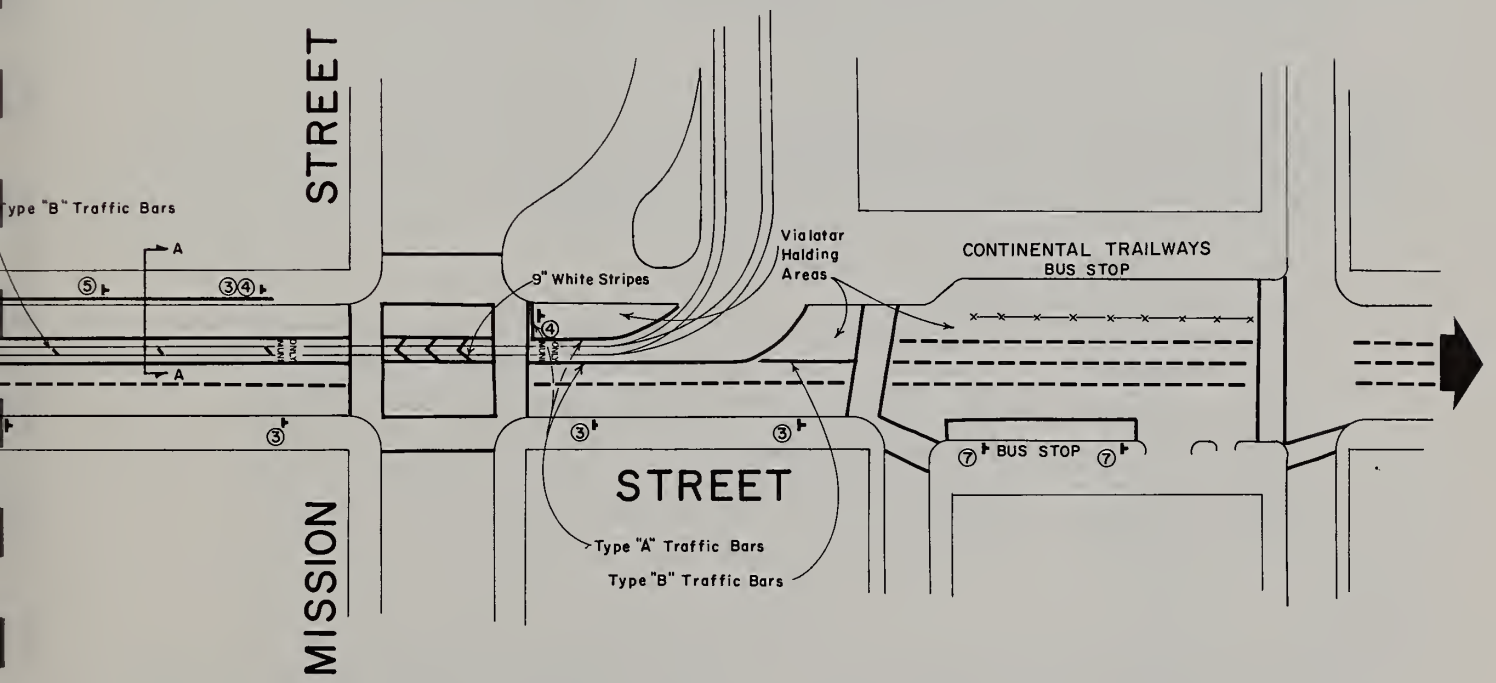


Phase I

First Street Improvement


①
LEFT LANE
MISSION ST.
LEFT
TURN ONLY
②
MISSION ST.
LEFT
TURN ONLY
FIRST
STREET
ONLY
③
NO STOPPING
3:30-6:30 PM
TOW AWAY
④
LEFT LANE
MUST
TURN LEFT
⑤
TRUCKS
PARK ON
CURB
⑥
MUNI
ONLY
⑦
NO
STOPPING
ANY
TIME
⑧
⑨
DO
NOT
ENTER
N
MARKET STREET
BUS STOP
50'
BATTERY
9" White Line
6" Curb
Type "A" Traffic Bars
Solid White Line
BUS STOP
FIRST
BUSH





Phase II

First Street Improvement

SHELTERS

Shelters for Major Transfer Points

Problem

One of the features commonly found on transit systems, and largely lacking in San Francisco, is shelters for waiting passengers.

Recommendation

Select major transfer points for provision of transit shelters, each tailored to the requirements of the particular location. The following 16 locations within the study area have been targeted for initial shelter installation:

Nineteenth Avenue at Winston, northbound
Nineteenth Avenue at Holloway, northbound
Nineteenth and Denslow, northbound
Mission at First, westbound
Fourth Street at Mission, southbound
Sixteenth Street at Bryant and eastbound
Mission at Twenty-Second, northbound and southbound
Twenty-Fourth Street at Bryant, westbound
Mission at Thirtieth, northbound and westbound
Silver at Mission, northeast corner
Geneva at Mission, eastbound
Thirtieth at Church, westbound
Potrero at Twenty-Second, northbound
Castro at Market, northbound and southbound
Church at Market, northbound and southbound
Ocean at Phelan, westbound

Analysis

Immediate action should be focused on stops where large numbers of people wait long periods of time. In weighing numbers of people versus waiting time, belief is that longer waits can be more uncomfortable in inclement weather and hence more critical in its effect on transit use.

Unfortunately, it is not possible to simply install standard shelters at every desirable point. Often the sidewalk is too narrow, or some storefront would be blocked. In certain places the shelters are not big enough, even with several units. In other areas special design treatment is warranted so as to be compatible with a prevailing design theme, e.g. at BART stations and within Market Street beautification area. In yet other places building awnings, overhangs, or colonades may make shelters unnecessary, provided that use of these building features is approved by owners.

Detailing exact location and design of shelters throughout the City is an extensive project, which requires continued attention of Muni and perhaps City Planning staff. Field work and negotiation must be accompanied by sensitive application of design principals. There is need for this work to begin immediately. Logically, shelters should be provided as part of the current City-wide Transit Improvement Program.

A few examples will serve to illustrate the design principals involved. (See Figures 19 and 20).

At 30th and Mission, large numbers of Muni riders block storefronts, and there is little space for a shelter. However, moving the bus stop about 50 feet would allow a shelter to be erected with its back to a parking lot, to the convenience of riders and merchants.

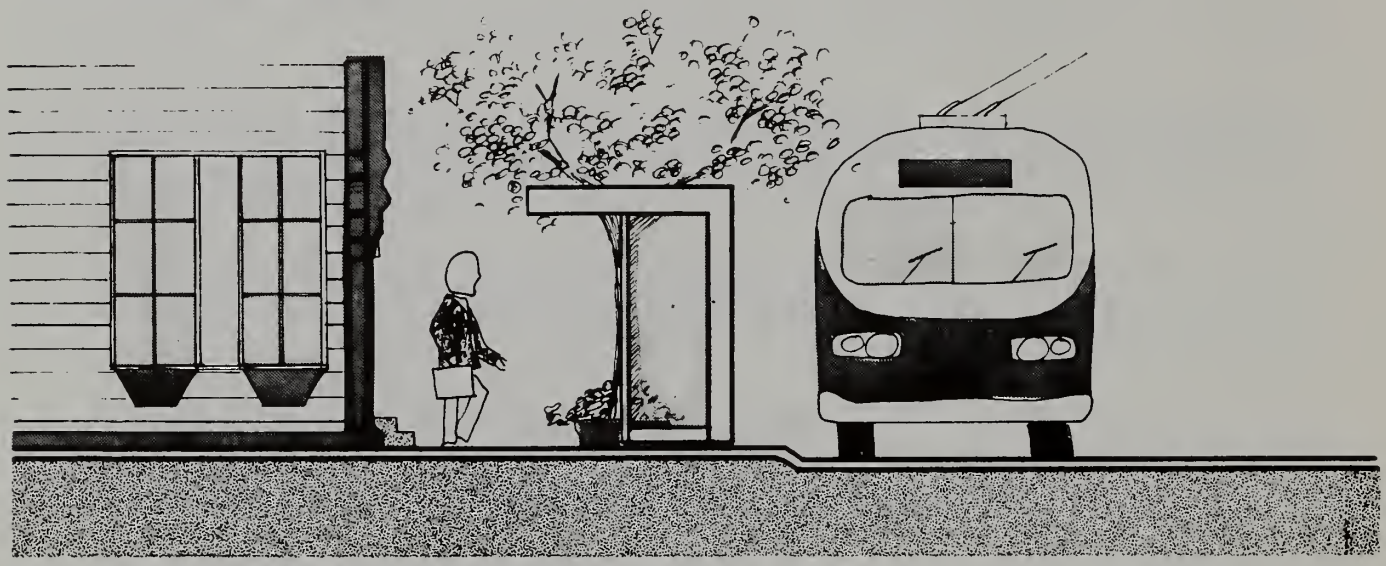
At Third and Market, the Hearst Building has a "Mansard" awning which also serves as shelter to Muni riders. Had it been made to project slightly more, it would have been even more functional.

Had the roof of the restaurant which presents a blank wall to 14th Street at 14th and Market been required to overhang the sidewalk, Muni riders who wait there would have had shelter from the rain. This sort of consideration might be made part of getting a building permit at a major Muni stop.

Cost Estimate

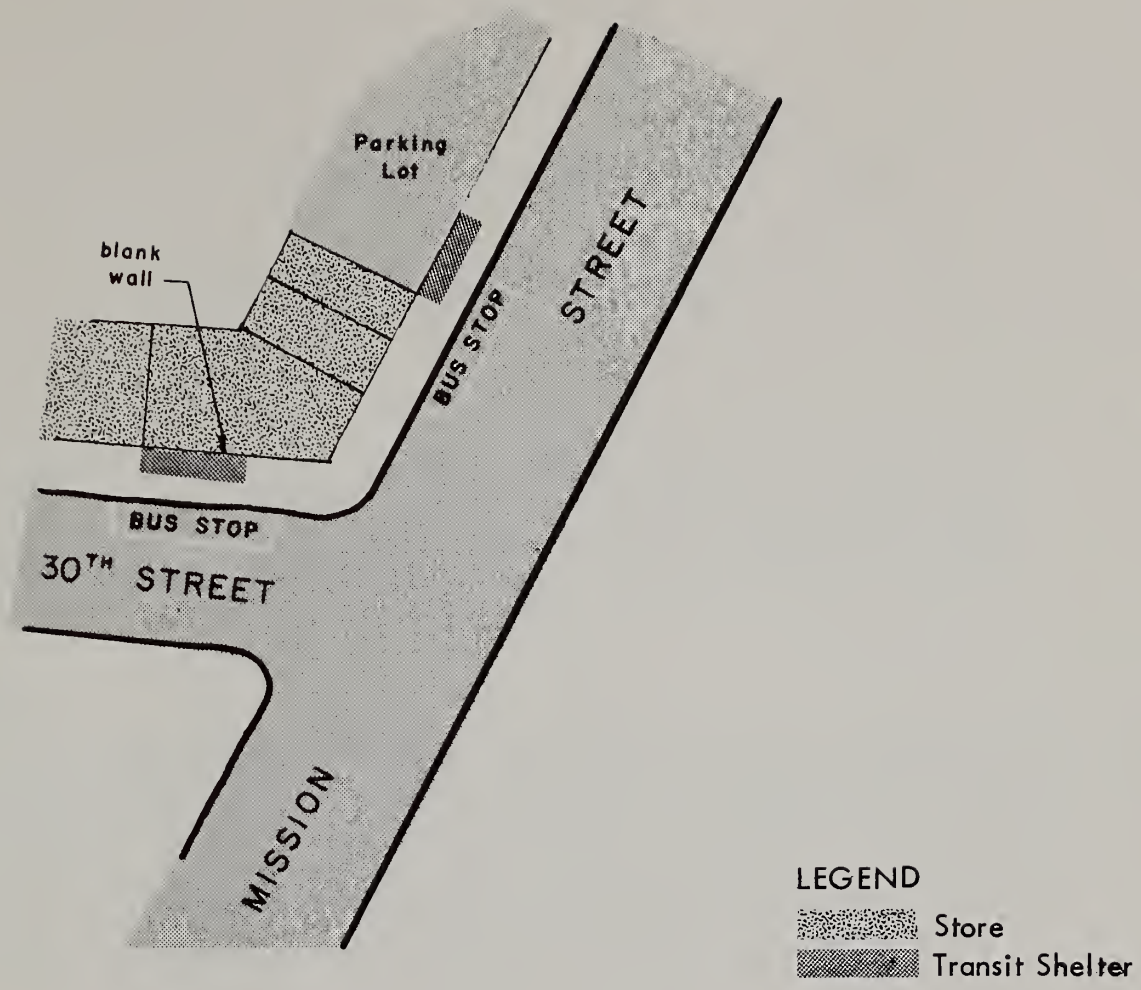
Nineteenth Avenue at Winston, northbound	$2,000
Nineteenth Avenue at Holloway, northbound	2,000
Nineteenth and Denslow, northbound	2,000
Mission at First, westbound	2,000
Fourth at Mission, southbound	2,000
Sixteenth Street at Bryant, eastbound	2,000
Mission at Twenty-Second, north and southbound	4,000
Twenty-fourth Street at Bryant westbound	2,000
Mission at Thirtieth, northbound and westbound	4,000
Silver at Mission, northeast corner	2,000
Geneva at Mission, eastbound	2,000
Thirtieth at Church, westbound	2,000
Potrero at Twenty-Second, northbound	2,000
Castro at Market, north and southbound	4,000
Church at Market, north and southbound	4,000
Ocean at Phelan, westbound	2,000
Contingencies (12 percent)	5,000
Total for all 16 Units	$45,000

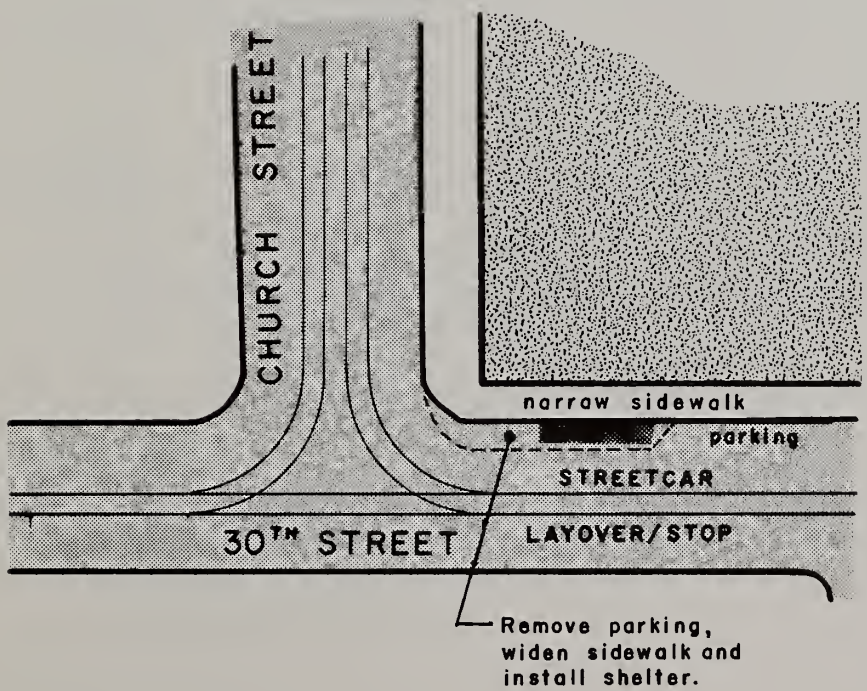
Standard Module Shelter



Narrow Sidewalk · Cantilever Module

Awning Option





Examples of Shelter Locations

PUBLIC INFORMATION

Transit Stop Signing/Design Coordination

Problem

In a city of intensive transit service, it is essential that the transit stops be clearly and uniformly indicated, and sufficient information be transmitted to make the system useful to the occasional or infrequent rider as well as to regular patrons. Related to the need to design an attractive standard Muni sign is the need to coordinate design of transit stop signs with design particulars for the new transit shelters.

Recommendation

A program of uniform transit stop sign installation should be immediately initiated by the Muni. Special attention should be given to adopting an attractive design with informative content. (See Figure 21 for recommended format). It must be remembered that a bus stop sign can be a poster advertising the extent of Muni's services to passersby, as well as a service to patrons. It is recommended that Muni retain an industrial designer to assist in the refinement of sign design and to ensure coordination of signs, vehicles and shelter design.

Financial Summary

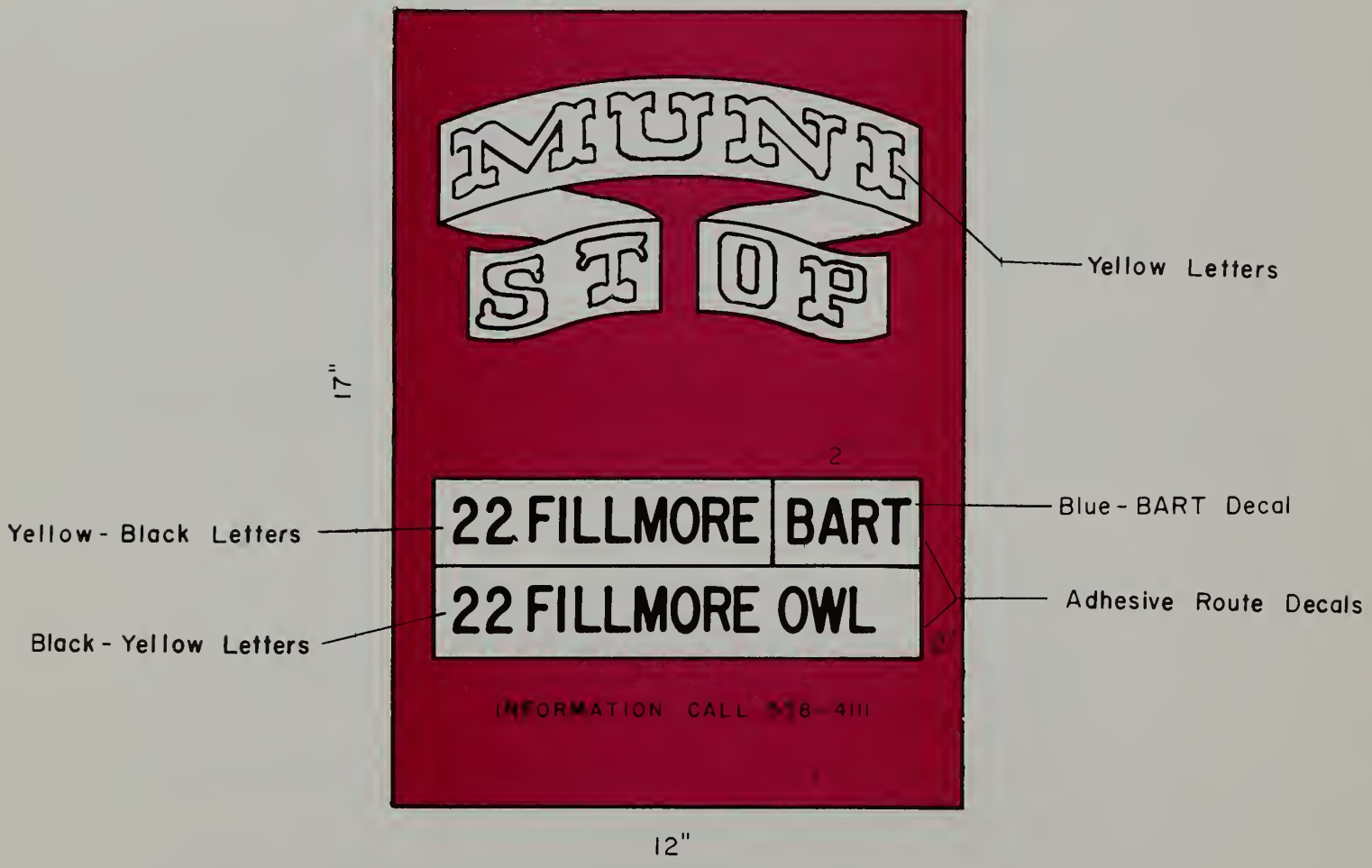
Capital cost $20,000 for Mission Corridor; $60,000 for the entire City. Maintenance $5,000 per year over present cost for the City.

Analysis

The design elements of transit stop signs can be identified as follows:

- Transit system logo or symbol, which people readily associate with Muni service. The logo should be eye catching, but not necessarily the biggest thing on the sign.
- Color scheme coordinated with the transit fleet's color combination, e.g., dark red and cream.
- Identification of the routes stopping at that location, including regular, express, limited, and owl services. Since such information may occasionally change, it must be fixed to the sign in such a way that it can be readily changed.

- An indication of direction or destination of the route.
- No "irrelevant" information should clutter the sign.
- A telephone number to contact for further information. Special numbers are more easily remembered and useful to the public; e.g., 666-MUNI or BUS LINE.



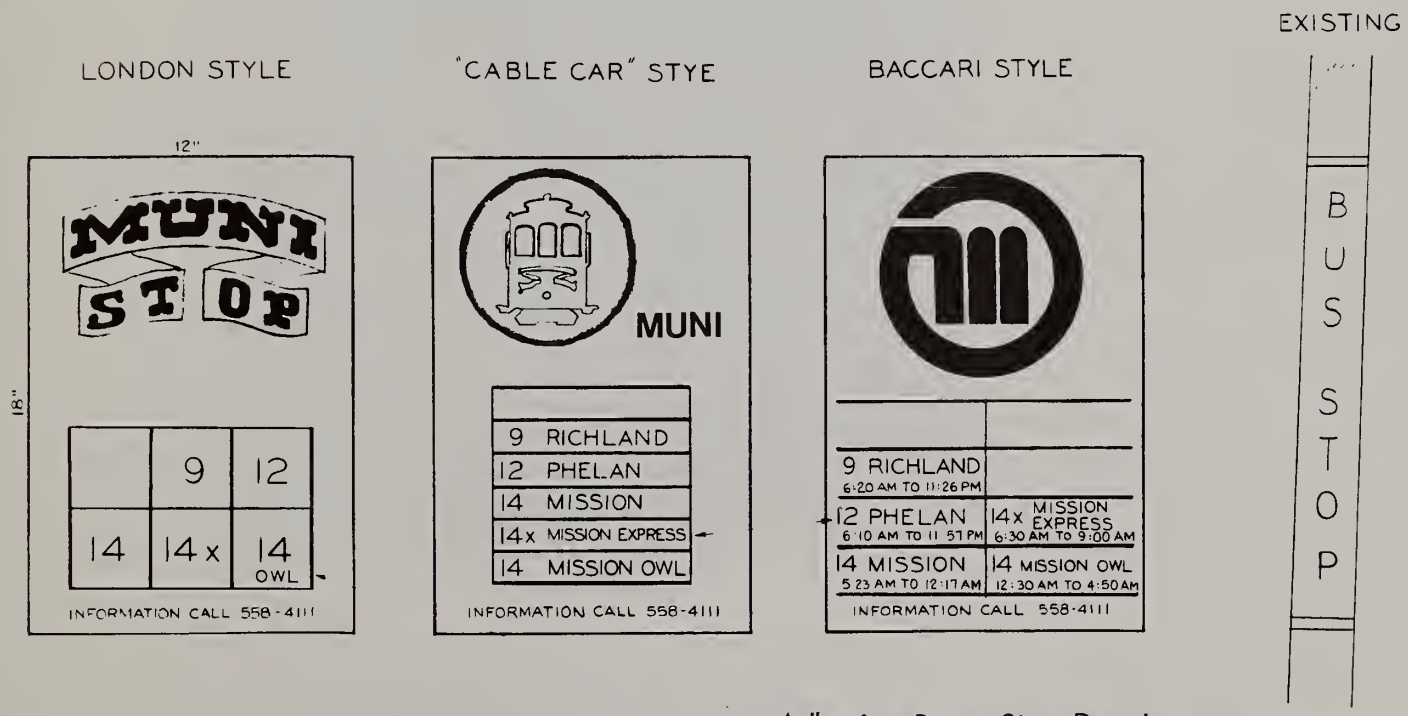
21
Recommended Sign Design

Three alternative sign designs were developed in this study for public comment. (See Figure 22). Each has a different logo, format, and level of detail in information presented. Citizens' comments study confirmed strong demand for uniform, informative transit stop signs. The amount of information desired on the sign, however, was too much to be compatible with the objective of good simple graphics. We concluded that it would be best to limit information on the sign to basic essentials, and to provide supplementary information on posted schedule cards and maps.

Comments were strongly in favor of using Muni's existing logo, with Muni red and cream color scheme. Route number and name appear to be the essential information to be shown on the sign. Indication of which routes go to BART will be useful.

Design shown in Figure 21 was developed around the above criteria. Route identification strips and BART feeder bus tags would be printed on adhesive plastic similar to annual stickers placed in the corner of auto license plates. BART tags could be attached to the route identification as shown, or attached as separate 10" x 2" strips.

Consideration should be given to adding directional indication to bus signs: "northbound", "southbound," etc. This may be particularly desirable at stops next to subway stations, since persons leaving the station are frequently disoriented.



Adhesive Route Sign Decals

Colors : Black Print on Yellow
Dark Red Background

22

Alternative Bus Stop Signing

The basic bus stop sign could come in three sizes:

- 12" x 17" for not more than 2 routes. Most neighborhood streets.
- 14" x 22" for not more than four routes. Main Streets.
- 18" x 32" for up to ten routes, on major transit arteries such as Haight Street and Mission Street. The standard 10" x 2" route indicator strip would be used on all sizes of stop sign.

The signs would be attached to utility or trolley poles, where available, by straps, or to specially installed 2" steel poles, as is now done for parking regulation signs. Signs should be out of reach, at least 8 feet off the ground, on the sidewalk side of the pole. The signs should be double-faced.

The cost of a double-faced 12" x 18" sign with eight-year life-span is $10 installed on an existing pole, and $30 installed on a new 2" pole with L bracket. The adhesive route stickers would be additional. For the almost 500 stops in the corridor study area, signing could be expected to run $20,000; for the City as a whole $60,000. The installation of signs is a capital improvement eligible for two-thirds federal financing. Maintenance, updating, and replacements would cost some $15,000 yearly citywide, thereafter. Against these costs must be set the saving of the present expenditure of painting stops on poles, and changing the hand-painted signs now used in some places in the City, which probably exceeds $10,000 yearly.

Publication and Distribution of Schedule Cards

Problem

Of some 71 daytime routes operated by Muni, only seven routes are so frequent (headway less than ten minutes) for the whole operating period that no patron would reasonably wish to know the time the next bus is due. Muni staff has begun preparing schedule cards, but is confronted with limited resources for printing and distribution.

Recommendation

The printing and distribution of schedule cards should be given high priority, starting with long headway lines. (See Figures 23 and 24, Muni and Portland examples). The resources of businessmen and City offices should be used to assist in distribution of the cards. Schedule cards printed on adhesive paper can be attached to poles or schedule collars at key stops. (See Figure 25).

Financial Summary

$20,000 per year for schedule card handouts. $4,500 for schedule holders at transit stops in the Corridor; $15,000 for entire City. $10,000 per year maintenance program for the City.

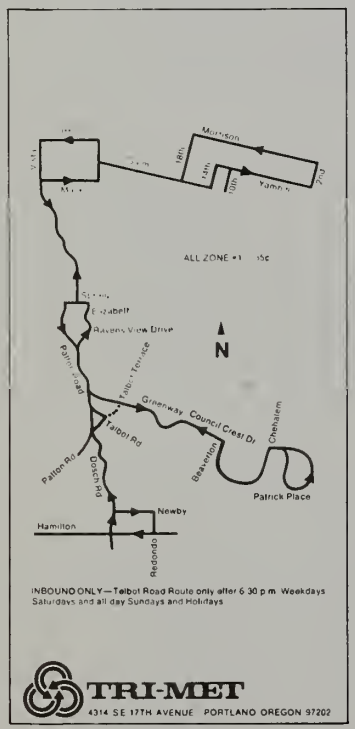
Typical Schedule Card
MUNI Example

Analysis

The services offered by Muni can be divided into those lines which offer service so frequent that the patrons are not interested in the timetable, and those lines offering less frequent service. Routine users of infrequent lines learn when the service runs -- provided they always travel at the same hour. However, should they travel at a time different to their habit, or should a new or infrequent user wish to ride the line, catching the bus is a hit or miss affair, and they could well have to wait the headway time to make their trip.

Of the 71 daytime Muni routes, 22 routes run all day at less than 10 minute headways, but exceed this headway in the evening. The remaining 42 routes have headways in excess of 10 minutes during peak periods and midday,, and 11 of these have headways of 30 minutes or more some of the day. In addition, 13 owl (all night) services are operated, all with headways of 30 minutes or greater. It can be seen that although some lines do maintain very frequent service, the majority do not. Lack of service information is known to adversely affect patronage on the less-used feeder lines.

Council Crest



INBOUND ONLY—Talbot Road Route only after 6:30 p.m. Weekdays Saturdays and all day Sundays and Holidays

TRI-MET
4314 SE 17TH AVENUE PORTLAND OREGON 97202

Council Crest—To Portland City Center

WEEKDAYS Effective May 15, 1972

Desch Rd. & Hamilton	Council Crest Dr. & Patrick Pl.	Patton Rd & Talbot	Spring & Vista	S.W. 18th Ave. & Salmon St.	S.W. 10th Ave. & Yamhill St.	S.W. 3rd Ave. & Morrison St
6:32	—	6:35	6:42	6:48	6:50	6:55
—	6:46	—	6:57	7:03	7:05	7:10
7:02	—	7:05	7:12	7:16	7:20	7:25
—	7:21	—	7:32	7:38	7:40	7:45
7:32	—	7:35	7:42	7:48	7:50	7:55
—	7:46	—	7:57	8:03	8:05	8:10
8:02	—	8:05	8:12	8:18	8:20	8:25
—	8:21	—	8:32	8:38	8:40	8:45
8:32	—	8:35	8:42	8:48	8:50	8:55
—	8:56	—	9:07	9:13	9:15	9:20
9:27	—	9:30	9:37	9:43	9:45	9:50
—	9:56	—	10:07	10:13	10:15	10:20
10:27	—	10:30	10:37	10:43	10:45	10:50
—	10:56	—	11:07	11:13	11:15	11:20
11:27	—	11:30	11:37	11:43	11:45	11:50
—	11:56	—	12:07	12:13	12:15	12:20
12:27	—	12:30	12:37	12:43	12:45	12:50
—	12:56	—	1:07	1:13	1:15	1:20
1:27	—	1:30	1:37	1:43	1:45	1:50
—	1:56	—	2:07	2:13	2:15	2:20
2:27	—	2:30	2:37	2:43	2:45	2:50
2:51	—	2:54	3:01	3:07	3:00	3:14
—	2:51	—	3:02	3:08	3:10	3:15
—	3:11	—	3:22	3:28	3:30	3:35
3:32	—	3:35	3:42	3:48	3:50	3:55
—	3:51	—	4:02	4:08	4:10	4:15
4:12	—	4:15	4:22	4:28	4:30	4:35
—	4:31	—	4:42	4:48	4:50	4:55
4:44	—	4:47	4:54	5:00	5:02	5:07
—	5:06	—	5:17	5:23	5:25	5:30
5:22	—	5:25	5:32	5:38	5:40	5:46
—	5:41	—	5:52	5:58	6:00	6:06
5:07	—	5:10	6:17	6:23	6:25	6:30
T5:35	—	6:38	6:45	6:51	—	—
—	6:36	6:40	6:47	6:53	6:55	7:00
—	7:00	7:04	7:07	7:13	7:10	7:24
—	8:00	8:04	8:07	8:13	8:10	8:24
—	9:00	9:04	9:07	0:13	0:10	S8:24
—	10:00	10:04	10:07	10:13	10:10	S10:24
—	11:00	11:04	11:07	11:13	11:19	S11:24
—	12:00	12:04	12:07	12:13	12:19	S12:24

Light figures are A.M. Dark figures are P.M.

T: Transfer to City Center bus at S.W. 18th and Salmon Street.

S: To transfer connections, S.W. 5th and Morrison, leaving 32 minutes past the hour.

SUBECT TO CHANGE WITHOUT NOTICE

SATURDAYS Effective May 20, 1972

Desch Rd. & Hamilton	Council Crest Dr. & Patrick Pl.	Patton Rd. & Talbot	Spring & Vista	S.W. 18th Ave. & Salmon St.	S.W. 10th Ave. & Yamhill St.	S.W. 3rd Ave. & Morrison St
6:10	—	6:15	6:22	6:28	6:30	6:35
—	6:44	—	6:52	6:58	7:00	7:05
7:20	—	7:25	7:32	7:38	7:40	7:45
—	7:51	—	8:02	8:08	8:10	8:15
8:20	—	8:25	8:32	8:38	8:40	8:45
—	8:51	—	9:02	9:08	9:10	9:15
9:20	—	9:25	9:32	9:38	9:40	9:45
—	9:51	—	10:02	10:08	10:10	10:15
10:20	—	10:25	10:32	10:38	10:40	10:45
—	10:51	—	11:02	11:08	11:10	11:15
11:20	—	11:25	11:32	11:38	11:40	11:45
—	11:51	—	12:02	12:08	12:10	12:15
12:20	—	12:25	12:32	12:38	12:40	12:45
—	12:51	—	1:02	1:08	1:10	1:15
1:20	—	1:25	1:32	1:38	1:40	1:45
—	1:51	—	2:02	2:08	2:10	2:15
2:20	—	2:25	2:32	2:38	2:40	2:45
—	2:51	—	3:02	3:08	3:10	3:15
3:20	—	3:25	3:32	3:38	3:40	3:45
—	3:51	—	4:02	4:08	4:10	4:15
4:20	—	4:25	4:32	4:38	4:40	4:45
—	4:51	—	5:02	5:08	5:10	5:15
5:20	—	5:25	5:32	5:38	5:40	5:45
—	6:01	—	6:12	6:18	6:20	6:25
6:30	—	6:36	6:42	6:45	6:50	6:55
—	7:00	7:05	7:12	7:18	7:20	7:30
—	8:00	8:04	8:08	8:14	8:20	8:30
—	9:00	0:04	0:08	0:14	0:20	S9:24
—	10:00	10:04	10:08	10:14	10:20	S10:24
—	11:00	11:04	11:08	11:14	11:20	S11:24
—	12:00	12:04	12:08	12:14	12:20	S12:24

SUNDAYS & LEGAL HOLIDAYS Effective May 14, 1972

	7:00	7:04	7:08	7:14	7:20	S7:24
	8:00	8:04	8:08	8:14	8:20	S8:24
	9:58	9:02	9:06	9:12	9:20	S9:24
	9:58	10:02	10:06	10:12	10:20	S10:24
	11:00	11:04	11:08	11:14	11:20	S11:24
	12:00	12:04	12:08	12:14	12:20	S12:24
	1:00	1:04	1:08	1:14	1:20	S1:24
	2:00	2:04	2:08	2:14	2:20	S2:24
	3:00	3:04	3:08	3:14	3:20	S3:24
	4:00	4:04	4:05	4:14	4:20	S4:24
	5:00	5:04	5:08	5:14	5:20	S5:24
	6:00	6:04	6:08	5:14	6:20	S6:24
	7:00	7:04	7:08	7:14	7:20	S7:24
	5:00	6:04	6:06	6:14	5:20	S5:24
	9:00	9:04	6:08	0:14	0:20	S9:24
	10:00	10:04	10:08	10:14	10:20	S10:24
	11:00	11:04	11:08	11:14	11:20	S11:24
	12:00	12:04	12:08	12:14	12:20	S12:24

24

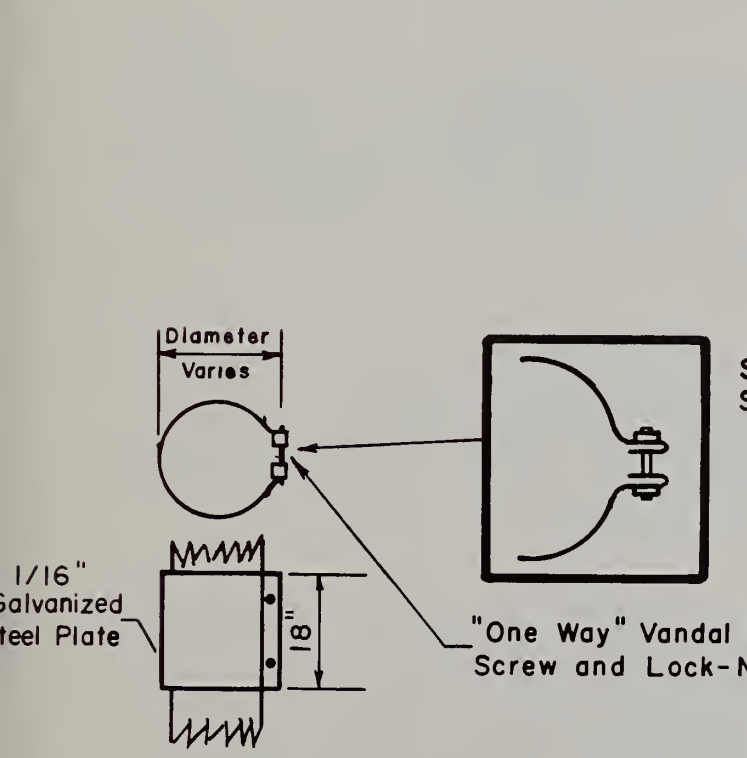
Typical Schedule Card

Portland Example

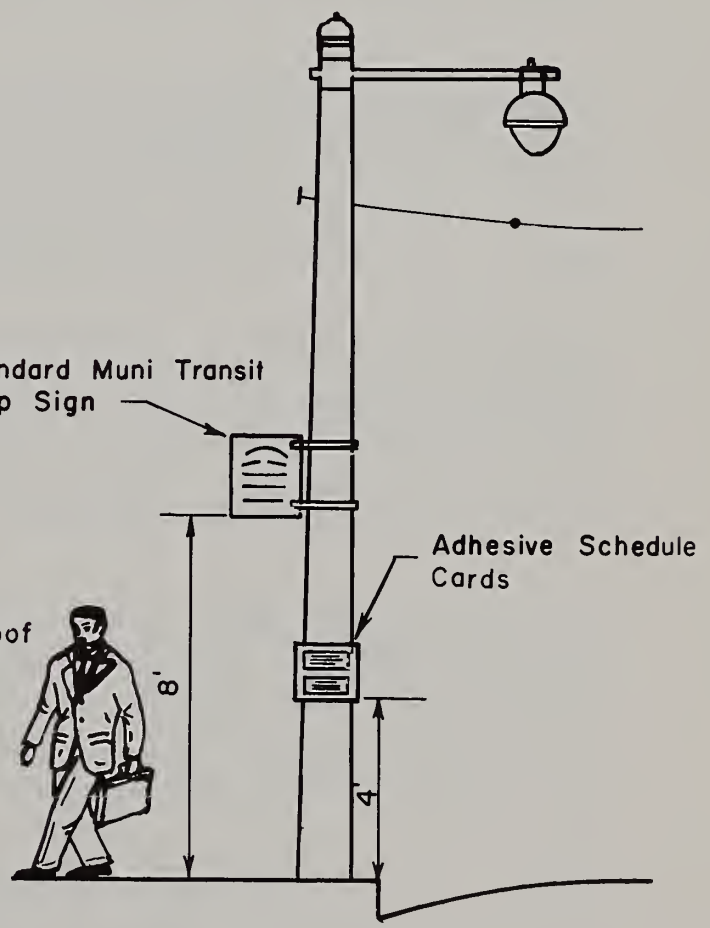
are operated, all with headways of 30 minutes or greater. It can be seen that although some lines do maintain very frequent service, the majority do not. Lack of service information is known to adversely affect patronage on the less-used feeder lines.

Schedule Card Handouts

The publication of schedule cards for public distribution for the infrequent lines is a practice used by many transit operators as the most convenient way to assist users of infrequent services. There are a number of characteristics of a good schedule card, almost all of which are embodied in those recently issued by the City Public Utilities Commission for the Owl services. They should be printed on a stiff card paper, to survive being carried in a pocket or handbag. The paper should be a distinctive color, preferably not white. The complete card should fold to a size of around 6" x 3". Too small a folded size gets lost; it also requires too many folds. The card face should carry the line number, Muni motif, and the date the schedule became effective. It could also have a space on which the sponsor or distributor can stamp his name -- e.g., "with the compliments of Wells Fargo" on the face.



SCHEDULE CARD COLLAR



COMPLETE ASSEMBLY - TRANSIT STOP SIGN AND SCHEDULE CARDS ON COLLAR

A change in schedule should be denoted by changing the schedule date, and preferably by changing the paper color. The interior of the card should contain a line diagram of the route, with the principal cross streets on a screened street map background, and a simplified route timetable. Regular interval lines can be condensed by the phrase "and then at ... minutes past the hour until..." Frequent services can be condensed by "and then at approximately four minute intervals until..."

Distribution of schedule cards is as important as printing them, and essential if new patronage is to be generated. Distribution may well be possible without cost to the Muni. Downtown and neighborhood stores, many of which are heavily dependent on transit riding patrons, are willing to distribute the cards should they become available. In this case, it would be necessary for Muni to provide only an expeditor, say a quarter of a man's time, to insure the cards are current, get printed, and sent to the distributor. City buildings, such as the libraries, should also hold a stock of cards for public distribution.

The estimated cost, based on the cards printed so far, would appear to be $20 per 1,000. An initial printing of one million for the system will cost some $20,000. Revisions occur on an average of once a year. From discussions with the Chamber of Commerce, it is possible that this cost could be met by allowing the printing to be done privately as a community service by a bank or group of businesses. The Chamber staff would be willing to explore this possibility. They might then handle distribution.

Posting Schedule Information at Transit Stops

During community meetings, considerable interest was expressed in having bus route and schedule information posted at stops. Placing headway and other information on the stop sign presents problems of space and legibility, as well as being different at each stop, and therefore lessens the possibility and advantages of uniform stop signs.

Fixed installations at passenger level may be expected to be vandalized. To meet the need for schedule information and at the same time to avoid heavy expenditures, we propose that schedule cards be printed on weather-resistant paper with adhesive backs (similar to bumper stickers), for attachment directly to metal trolley poles and shelters. A metal schedule collar could be attached to wooden and other rough poles. The schedule posting would be provided at transfer stops and perhaps at every fourth stop along a line. Vandalizing such cards is dull work, and since the cards would be cheap, replacement cost to the Muni would be minimal. In many neighborhoods cards could be expected to last the life of the material. A six-month updating and replacement program would insure the availability of Muni schedule information throughout the City. Protection of the information from defacement would be the neighborhood's rather than the Muni's problem.

Cost Estimate

100 Schedule Collars @$20	$2,000
1000 Adhesive Cards @$.50	500
Installation	2,000
Total for Mission Corridor	4,500
Total City Wide	14,000

Maintenance and replacement program, citywide $10,000 yearly.

System Mapping

Problem

The Muni system of routes and schedules is complicated, but doubly so if poorly illustrated. During the coming year, BART station vicinity maps will be prepared and both Muni and BART plan to publish Muni route maps for the benefit of their riders. Duplication of effort should be avoided.

Recommendation

Proposed mapping should include all public transit services available for all of San Francisco. (See Figure 26 for suggested mapping technique). Each public transit agency should have the opportunity to review maps for accuracy and clarity prior to printing. MTC would serve as mapping coordinator.

Analysis

Potential exists through preparation of quality maps to increase public understanding of the coordinated BART and Muni system, and hence increase patronage. The BART station map graphics being prepared by Hasada Design are good illustrations of how to present a great deal of detail, but maintaining the feeling of overall clarity and simplicity. The Muni map, when redrawn to show BART, new BART feeder services, and realignments should strive for some of the same qualities of the BART station graphics:

- City street and freeway system screened as a background
- Use of soft tone colors
- Use of each color to convey information

Recommendations for both Muni and BART mapping in San Francisco include:

- Indicate transfer points to AC Transit, Golden Gate Transit, Greyhound, and Southern Pacific.
- Differentiate between frequent trunk lines and "feeders" by line thickness (Figure 26).
- Show "owl" lines (thin black line superimposed on trunk route as shown).
- Show the entire City on one map and the downtown triangle (bounded by Van Ness, Embarcadero, and Bay Bridge freeway approach) as a separate map.

BART and MUNI

Trunk Route -- Frequency at least every 10 Minutes all Day

Feeder Route -- 10 to 30 Minute Midday Service

Trunk and Owl Route

Special Events, Shuttle or Rush Hour only

26

Route Map Illustration

DE LEUW, CATHER & COMPANY
Principal Participating Staff

Gustave E. J. Lamart	Project Manager
Bernard Byrne	Transit Planning Engineer
Gerald Fox	Transit Planning Engineer
Paul F. Halley	Transit Planner
Hans Herve	Traffic Engineer
Gerald Snyder	Transit Analyst